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No. 123

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25 October 1979

USSR REPORT
BIOMEDICAL AND BEHAVIORAL SCIENCES

No. 123

This serial publication contains articles, abstracts of articles and news items from USSR scientific and technical journals on the specific subjects reflected in the table of contents.

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ADMINISTRATION OF SOVIET SCIENCE

CONTINUED DEVELOPMENT OF MEDICAL SCIENCE IN SIBERIA AND THE FAR EAST

Moscow PRAVDA in Russian 24 Aug 79 p 1

[Text] The CC CPSU and USSR Council of Ministers considered the matter of continued development of medical science in regions of Siberia and the Far East. In a decree they adopted, it is noted that fulfillment of the tasks of constant rise of the material and cultural standard of living of the people set forth by the Communist Party, and the right of citizens to health care as set forth in the new constitution of the USSR must be closely related to refinement of work of public health institutions, expansion of scientific research directed toward preventing and lowering morbidity, and prolonging the period of active life of Soviet people. Continued development of medical sciences is gaining particular importance for Siberia and the Far East where, in accordance with the decisions of the 25th CPSU Congress, enormous work is being deployed to implement the program of comprehensive development of the natural resources of these regions, which are of vital importance to our country.

Work has been done in the years of Soviet power to develop a network of medical scientific research institutions and VUZ's, to train highly qualified medical scientists. At the present time, scientific institutions and VUZ's under the health ministries of the USSR and RSFSR and Siberian Branch of the USSR Academy of Medical Sciences are working there on problems of medical science. The Siberian departments of the USSR Academy of Sciences and All-Union Academy of Agricultural Science imeni V. I. Lenin are involved in resolving biomedical and sociohygienic problems.

At the same time, the CC CPSU and USSR Council of Ministers observe that there is still a lag in development of the network of scientific medical institutions, the level and scope of biomedical research in Siberia and the Far East are still behind the increasing demands of public health care.

Many medical scientific research institutions, as well as the Siberian Branch of the USSR Academy of Medical Sciences, have a poor material and technical base, they are not fully staffed by highly qualified personnel, and they are not involved actively enough in solving a number of medical problems related to improved medical care and health protection.

The USSR Ministry of Health and USSR Academy of Medical Sciences have not taken appropriate steps to coordinate research conducted at scientific research institutes and medical VUZ's, with due consideration of continued intensive development of medical science in the eastern part of our country.

The CC CPSU and USSR Council of Ministers have deemed it mandatory to implement a broad program of measures directed toward continued development of medical science, training of highly qualified scientific personnel for medical scientific research institutes and rational assignment [distribution] thereof in eastern regions, for the purpose of expanding scientific research in the area of theoretical and clinical medicine, and in order to resolve the most important sociohygienic problems in Siberia and the Far East.

It was suggested to the USSR Ministry of Health, USSR Academy of Medical Sciences, RSFSR Council of Ministers, kray and oblast party committees, ispolkoms of kray and oblast soviets of people's deputies of Siberia and the Far East that they concentrate the efforts of the staffs of medical scientific research institutions on comprehensive development of basic and applied research dealing with the main problems of medicine, improvement of effectiveness of work of scientific research institutes, better coordination of their work and strengthening the ties with therapeutic and preventive institutions.

The USSR state committee for science and technology of the USSR Academy of Sciences, USSR Academy of Medical Sciences, All-Union Academy of Agricultural Science imeni V. I. Lenin, along with the USSR Ministry of Health and RSFSR Council of Ministers, were asked to develop long-term plans for complex re-investigations on the study and continued development of biomedical, sociohygienic and medical problems of Siberia and the Far East, and to implement development of scientific research on wild medicinal plants in order to put the huge natural resources of these regions more fully to the service of human health.

It was recommended that the RSFSR Council of Ministers examine matters related to establishment of special sanctuaries to protect the natural flora, as well as expansion of the network of farms and enterprises engaged in cultivation of medicinal plants.

In view of the increasing demands with regard to planning, coordination and forecasting scientific research conducted at medical scientific research institutions and medical VUZ's of Siberia and the Far East, dealing with the most important problems of medicine, it is deemed desirable to convert the Siberian Branch of the USSR Academy of Medical Sciences into the Siberian Department of the USSR Academy of Medical Sciences. There are plans to implement measures to strengthen the material and technical base of medical scientific research institutes and scientific departments of medical VUZ's located in Siberia and the Far East.

The USSR state committee for science and technology, along with the RSFSR Council of Ministers and USSR Academy of Medical Sciences, are requested to consider matters of organizing, as part of the Siberian Department of the

USSR Academy of Medical Sciences, scientific research institutions to deal with problems of pulmonology, surgery, endocrinology, medical genetics, immunology and biochemistry, as well as a branch of the All-Union Cardiological Research Center of the USSR Academy of Medical Sciences.

The decree spells out plans for the construction of an institute of physiology, library, medical school (in Novosibirsk), institute of medical problems of the north (Krasnoyarsk), laboratory of polar medicine (Noril'sk), institute of complex problems of hygiene and occupational diseases (Novokuznetsk) and institute of mother and child care (Khabarovsk) for the Siberian Department of the USSR Academy of Medical Sciences. The USSR Gosplan provides for allocation of the necessary capital investment, starting in 1980, for designing and building the above projects in the drafts of state plans for economic and social development of the USSR.

It is imperative to increase the number of seats for active (academicians) and corresponding members of the USSR Academy of Medical Sciences in order to man the Siberian Department of the USSR Academy of Medical Sciences with scientists specializing in the main directions of medicine.

Permission has been granted to the USSR Ministry of Health and RSFSR Council of Ministers to publish a bulletin of the Siberian Department of the USSR Academy of Medical Sciences, for the purpose of improving the dissemination of scientific and technical information about development of medical science and public health in Siberia and the Far East.

The RSFSR Council of Ministers was asked to settle housing problems by assigning space in the buildings of local soviet ispolkoms for the staff of newly organized scientific research institutions of the Siberian Department of the USSR Academy of Medical Sciences.

The CC CPSU and USSR Council of Ministers express their confidence that the kray and oblast party committees and ispolkoms of kray and oblast soviets of people's deputies, ministries and agencies, staffs of scientific medical institutions and medical VUZ's will take the necessary steps for continued development of medical science and upgrading public health in Siberia and the Far East.

[553-10,657]

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CSO: 1840

FUTURE PERSPECTIVES IN GENETIC ENGINEERING

Moscow PRAVDA in Russian 13 Sep 79 p 2

[Article by Academician D. Belyayev, chairman of the scientific council for problems of genetics and breeding, USSR Academy of Sciences, Novosibirsk]

[Text] A previously unknown protein, the enzyme revertase, was discovered in the late 1960's to early 1970's as a constituent of viruses that induce tumors. In general, it is not so rare for scientists to discover new enzymes that accelerate the most diverse reactions in live cells, but this one prompted special attention. It was learned that DNA synthesis on RNA templates may occur in cells with the help of revertase. This was a new, previously unknown route of transmission of hereditary (genetic) information; it was previously assumed that there is only RNA synthesis on DNA templates in nature. Thus, the discovery was of basic importance to the solution of key problems of modern molecular biology and genetics.

Revertase became the concern, not only of basic branches of biology, but applied ones, in particular, oncology and virology. It became obvious that there was an urgent need to immediately undertake the study of the properties of this enzyme.

This is how the "Revertase" project emerged, the initiator and organizer of which was Academician V. A. Engel'gardt.

The participants in this project included institutions of the USSR Academy of Sciences and its Siberian department, Ukrainian and Latvian academies of sciences, USSR Academy of Medical Sciences, USSR Ministry of Higher and Secondary Specialized Education, Glavmikrobioprom [Main Administration for the Microbiological Industry]. The scientists of GDR and Czechoslovakia have also made and continue to make an important contribution to implementation of this project. The Institute of Molecular Biology, USSR Academy of Sciences, assumed the duties of the chief institutions.

I do not intent to cover all of the achievements obtained within the framework of this project. But it is necessary to mention at least a few of the studies in order to demonstrate the effectiveness of a special goal-oriented international program.

In 1976, virtually simultaneously with the leading laboratories of the United States and Western Europe, the participants in the project succeeded in performing enzymatic synthesis, using maltase, of the gene responsible for the structure of one of the main proteins of the animal organism, globin (it is contained in hemoglobin, the coloring substance of blood that transports oxygen). This laid the foundation for development of an important direction of gene engineering in the GDR and other socialist countries, and it put the participants in the project among the ranks of world leaders in this branch of science.

There is also another utterly original study, in the course of which genetic material (DNA) was synthesized from one, preselected point on the template molecule. Analogous studies were conducted in the West only 2 years later. Subsequently, this approach resulted in development of a new method of decoding the structure of RNA, one of the main problems of molecular biology.

Enzymatic synthesis of DNA cannot start without special compounds (primers). Synthesis of the primers themselves is an extremely complex task for organic chemists, and specialists of the highest qualifications spent many months on it. The participants in the "Revertase" project have found a method, which is based on the so-called phase principle. It makes it possible to obtain these compounds within a week. This applies not only to primers, but entire genes for proteins with a low molecular weight, including hormones; along with theoretical importance this has considerable practical significance.

Consolidation of fraternal ties between scientists of socialist nations was an important result of joint implementation of the project. The scientists of GDR and Czechoslovakia obtained particularly important advances in the study of tumorigenic viruses and mastering techniques for the synthesis of some important compounds. At the present time, socialist nations hold firm positions in this important branch of biology.

Implementation of the scientific program of the "Revertase" project has been deservedly submitted for the USSR State Prize.
[567-10,657]

USE OF BIOLOGICAL PRODUCTS IN GEORGIA TO CONTROL PESTS

Moscow ZASHCHITA RASTENIY in Russian No 5, 1979 p 28

[Article by K. N. Dzhibladze, candidate of biological sciences]

[Text] Georgia has the role of discoverer in the history of using the biological method of controlling agricultural pests in the USSR. With the introduction into this republic, in 1931, of the predatory Australian lady beetle [*Rodolia cardinalis*] (for the control of fluted scale), successful biological protection of citrus trees began, followed by importation of *Cryptolaemus montrouzieri* and *Coccophaga gurnei* (against citrus mealybugs), *Aphelinus mali* Haldemann [woolly aphid parasite] (against woolly apple blight), *Lindorus* (against scale) and, finally, *Proctosphaera berlesii* (against white peach scale) and entomopathogenic fungi of the genus *Aschersonia* (against the citrus whitefly), etc.

With each year, the areas of application of biological agents for the protection of plants against such dangerous agricultural pests as *Muridae*, citrus mealybugs and currant scale, scale, gnawing moth, etc., have been expanding in this republic. In 1970, for example, the biological method was used only over an area of 5000-6000 ha [hectares], while in 1977 about 40,000 ha of annual and perennial crops had already been treated. *Bacterhodendroid* is prominent among the biological products. Last year, it was used against *Muridae* over an area in excess of 30,000 ha, with 90-95% technical efficacy.

In 1977, entobacterin (4 kg/ha) was used in the eastern parts of this republic on 7000 ha of vineyards against the European grape moth, and dendrobacillin (2 kg/ha) was tested (on 1000 ha) in Bolnisskiy Rayon. Treatment with biological products exterminated up to 75% of the pest caterpillars.

Entobacterin and dendrobacillin were also tested against the pests of vegetable crops in western and eastern Georgia over an area of 3000 ha. With the use of entobacterin (4 kg/ha) 70% of the bollworms and 85% of the white butterflies; with dendrobacillin (2 kg/ha) the figures were 85 and 95%, respectively.

In the last few years, more attention has been given to protection of plants in Georgian SSR. Measures to control pests and plant diseases began to be implemented in a more organized way and with greater effect; research intensified in the area of pressing problems.

Recently, the scientists of the Georgian Scientific Research Institute of Plant Protection received a new modern complex of buildings with well-equipped laboratories, offices, hothouse and insectarium.



Hothouse (left) and
main building of institute



Last year, *Cryptolaemus* beetles were put out over 500 ha against the pests of tea plants, citrus crops and grapes (citrus mealybugs, scale, pulvinaria and woolly grape scale). In some cases, at the instructions of the Ministry of Agriculture, biological material was also distributed for the protection of plots near houses.

The entomopathogenic fungus, *Aschersonia*, plays a large role in controlling citrus whiteflies in western Georgia (Adzharskaya ASSR and Makharadzevskiy Rayon). The red and yellow forms thereof exterminated up to 90% of the citrus whiteflies in some years. The high efficacy of *Aschersonia* and local pathogenic microorganisms of the genus *Cladosporium*, *Fusarium*, *Alternaria*, *Aspergillus*, etc., make it possible to limit the use of pesticides on citrus crops in western Georgia.

The predatory Katanu beetle (Coccinellidae) is acclimating and reproducing well in the Adzharia region; it was introduced in 1972. According to the data of the Georgian State Inspectorate for Plant Quarantine, this entomophage actively destroys eggs and larvae of the citrus whitefly.

In 1978, the biological method was used in this republic to protect more than 45,000 ha of crops in the open ground, of which 20,000-25,000 ha were treated only with *enbacterin* and *dendrobacillin*.

In order to expand the use of biological products, several measures have been outlined and implemented in this republic. New industrial biological laboratories have been put in operation in Batumi and Zugdidi. Each of them produced 3 million *Cryptolaemus* predatory beetles in 1978. A two-line biological factory for the production of *Trichogrammatidae* has already been delivered and assembled at the Zugdidi biolaboratory. The biological material produced there will be used, for the first time, to control pests of vegetable and cucurbitaceous, field and fruit crops. Production of an experimental batch of semisynthetic nutrient medium has been organized at the Batumi biolaboratory for reproduction of *Cryptolaemus*.

Construction has been completed on the Gori Industrial Biolaboratory, which will begin to produce *bactorhodencid*, then when the biofactory is started, it will also produce *Trichogrammatidae*. In 1979, construction will be completed as well on the Sukhumi Industrial Biolaboratory. In addition, there are plans to build biological laboratories in Gurdzhaani and Telavi, which will be chiefly engaged in reproduction of *Cryptolaemus* and *Lindorus*, and the one in Gurdzhaani will also begin to produce *bactorhodencid*.

The Plant Protection Administration of the Georgian Ministry of Agriculture, along with the Georgian Institute for Plant Protection, developed new specialization and plans for operation of industrial biological laboratories in this republic.

[657-10,657]

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MICROORGANISMS AS HARVEST PROTECTORS

Moscow ZASHCHITA RASTENIY in Russian No 5, 1979 pp 16-18

[Article by N. V. Kandybin, doctor of biological sciences, deputy director of the All-Union Scientific Research Institute of Agricultural Microbiology]

[Text] Plant life would be impossible without microbes. They are the "cooks" who prepare food for plants, and they are also the "sanitation workers" that utilize all waste; many of them, the so-called pathogens, are adapted to parasitism and live at the expense of other organisms. Microbes constitute the basis of everything living in any agrobiocenosis. As microscopic beings, they are amazingly flexible and viable: they can be encountered in abundance both in the cold North and in the hot desert. There are particularly many microbes in soil: each gram thereof contains tens, hundreds of millions and sometimes billions of them; there is a constant struggle for existence among them, for space and nutrients, and because of the tremendous rate of reproduction there is very rapid succession of populations thereof.

Man began to use microbes long ago to satisfy his needs and has made particular strides in this respect in recent times, when biological science and microbiology in particular began to develop intensively. However, while the world of animals and plants has been largely put in order with regard to nomenclature, the world of microorganisms is only about 10% known to us, in the first place, and systematics thereof is far from perfect, in the second place, which is quite explainable if we take into consideration the microscopic size, enormous diversity and distribution in the entire biosphere. Nevertheless, microorganisms are presently being used very extensively in various branches of the national economy, including agriculture.

With each year, increasing use is being made, both in our country and abroad, of microbiological means of protecting plants (bacteria, fungi, viruses, rickettsiae, protozoans). To date, about 50 commercial and experimental microbial products have been developed, not counting antibiotics, including 16 in our country (bactrohodencid, entobacterin, dendrobacillin, insectin, bitoxybacillin, BIP, homelin, cornecin, boverin, entomofluorin, pecilomin, ascheronia, virin-EKS, virin-ENSh, virin ABB, nematoda). In spite of the rather wide assortment of microbial products, the range of application thereof is still insignificant. Only bactrohodencid, entobacterin

and dendrobacillin are used more or less extensively (over 2-3 million hectares per year), while the rest are undergoing prolonged trials and have still not been adopted in plant protection practice.

In this article, we should like to share some views on the prospects of the microbiological method of plant protection and, first of all, technology of use, since it is expressly in this area that there are a number of substantial gaps that minimize the advantages of the method. We are quite aware of the fact that evaluation of the method and prospects thereof depend also on the technological forms of biological products, but we shall omit this part of the problem in the hope that it will be dealt with in a special work.

Up to the present, microbial products are used, like pesticides, as a means of primary one-time treatment of a pest, without consideration of their long-range ecological effect on the population. Yet microbiological products have a number of specific distinctions in their influence on insects and rodents. This is understandable, since we are dealing here with a pathogen and host macroorganism. All microorganisms that produce biological products are isolated from nature, and their correlations with macroorganisms were formed in the course of lengthy evolution. Many biotic factors, which often determine the activity, contagiousness and variability of a pathogen and susceptibility of a host, have left their imprint on these antagonistic relations, which are genetically fixed in both. Unquestionably, when using a microorganism as a biological agent for the control of a pest one cannot fail to take these distinctions into consideration. However, unfortunately, this is not yet done adequately by far as yet, and the reason is the limited knowledge we have about genetic and ecological capabilities of the pathogen and its host, the conditions of manifestation of pathogenic microbial properties and resistance of macroorganisms. Moreover, we are still not adequately informed about all the potential properties of pathogens, in particular the effect of microbes on growth, development and reproduction of the host on the population level, preservation, contagiousness and spontaneous variability of the pathogen in the environment, etc. Yet all of these elements ultimately determine the efficacy of the microbiological method, and the ecological properties of pathogens and their hosts should always serve as the basis for developing effective means of using them.

Let us cite some examples. Two microbes and two products, boverin and bitoxybacillin (BTB) have been proposed for the control of the Colorado beetle. Very different findings are made when potato bushes invaded by Colorado beetles are treated with these products: In the first place, the effect of each of them depends on the temperature and humidity, and this applies particularly to boverin. In the second place, boverin affects more effectively than BTB the older larvae and imagoes, while BTB does so for younger larvae. In the third place, beetle larvae infected with boverin often perish in the soil at the pupa stage (where the conditions for manifestation of this infection are optimal). In the fourth place, by virtue of presence of exotoxin in sublethal doses, BTB induces a teratogenic effect in pupas and

Images that emerged from infected larvae, and it lowers the virulence of the daughter generation.

Here are other examples of variability of a pathogen. Artificially introduced into a *Bacterium* (Silberstein) bacteria, which are used for the production of bacteriophage, are disavowed from the virulent Σ form into a mildly virulent or avirulent Σ form upon reaching natural conditions, under the influence of various stress factors (insolation, high temperature, desiccation, phages, etc.), which affects significantly extinction of an epidemic in a rodent population. Intimopathogenic bacteria, such as *Bacillus thuringiensis* and *Serratia marcescens*, lose some of their valuable properties after some time in soil, water and tree trunks: the bacillus does not form crystalline endotoxin, while *S. marcescens* does not form the pigment prodigiosin. In both cases, these changes lead to decrease in virulence. But, as it was found, the lost properties can be readily restored through passage of these bacteria through a susceptible insect. All of these biological distinctions influence the success of using pathogens to protect plants.

Just as many examples could be cited with regard to biological distinctions of an insect or rodent, which affect the outcome of correlations with the microorganism. Here, not only the species of the pest and phase of its development, but physiological state of the population, viz. density, availability of feed and shelter, migration, etc., are important. An epidemic in a population of large white (cabbage) butterflies is strongly dependent on the temperature. Elevation thereof could not only intensify the bacterial epizootic, but provoke spontaneous occurrence thereof. It has been established that young specimens of the common mole and pregnant females of this species are more resistant to bacillus bacteria; for this reason, the older the age structure of a population, the more intensified the bacterial epizootic in it. Lethalism is prevalent among small *Meriones*, particularly with a high density thereof and a shortage of feed. Obviously, the microbiological method is the most rational under such conditions, since favorable conditions are created for the spread and action of the pathogen.

Introduction of a pathogen into an insect population induces, in addition to a lethal effect, a significant change in development and metamorphosis, in the direction of delay. Thus, when potato crabs are treated with 0.1% BTB suspension, Colorado beetle larvae are severely retarded in growth, pupa formation and emergence of imago. In an experiment conducted by L. M. Rykina and L. A. Yarevich, only 4.2% of the 3d-stage larvae given a sub-lethal dose of BTB developed to the pupa stage after 15 days, whereas all specimens reached it in the control. BTB has an analogous effect on moths (bellworm, turnip and beet army worm). Thus, along with acute infection there is also chronic infection, with certain adverse consequences, among insects, as in warm-blooded animals. However, when evaluating microbiological methods of plant protection, only the acute nature of infection is taken into consideration, while the chronic course is not. Yet the latter causes drastic functional changes and disturbances in the population, which also leave a trace in daughter generations.

Analysis shows that as long as microbiological agents are used as pesticides, without consideration of specific distinctions of pathogens and conditions of their maximum effect on a pest, it will be difficult for the microbiological method to compete with the chemical one, with respect to economic indices.

The biological method should be used chiefly to depress reproduction of harmful species and, to a lesser extent, for immediate extermination thereof with one-time use. The use of microorganisms, as well as other biological agents, could proceed in two directions: creation of conditions for maximum spontaneous manifestation of pathogens in order to induce mass epizootics in populations of pests; artificial saturation of agrobiocenoses with pathogens in order to retard mass reproduction and increase in number of pests. Both procedures must be elements of an integrated system of plant protection, and they should replace chemical treatment, reducing the pesticide burden on the biosphere.

I. I. Mechnikov had already called for the epizootiological direction in the use of pathogens to depress the number of harmful species. His ideas were then developed by V. P. Pospelov, S. K. Metal'nikov and Ye. V. Talalayev. However, in the last few years, the developers of the microbiomethod, who became enthused by increasing production and using microbial products, did not pay enough attention to questions of technology and evaluation of methods used. Quite often, it is recommended that microbiological products be used in maximum doses assuring extermination of pests, just like chemical pesticides. There is no scientific substantiation for this approach, since it does not take into consideration the distinctions of the method. Unquestionably, any pathogen, be it a pathogen of insect, bird or other animal disease, must have contagiousness and induce periodic epizootics under specific conditions, otherwise it is impossible for it to exist. And if this is so, our task is to make an in-depth study of these processes, find the conditions that enhance development of epizootics and develop procedures for epizootiological use of pathogens in the control of pests.

In addition, experimental material has already been accumulated on the meta-toxic effects of bacteria, viruses, fungi, protozoans and metabolites thereof on insects and rodents. Many microorganisms and their metabolites induce, even in sublethal doses, various pathological changes in insects and rodents: retarded growth and development, teratogenic effect, impairment of processes of metamorphosis and ecdysis (or moulting), lowered reproductivity, etc. All these disturbances lead to depression of the pest, which sometimes extends to its daughter generation. Let us consider, for example, treatment of potato plants with low doses of titoxibacillin or boverin. Under their effect, not only are growth and development of the Colorado beetle retarded, but metamorphosis is impaired. Pupae and imagoes from infected larvae are often underdeveloped and their subsequent development is impaired. Not infrequently, the surviving imagoes are deformed (without maxillae or antennae, occasionally with legs instead of antennae, shifting of location of eyes and other organs, etc.). It is apparent that most such beetles,

even those without visible morphological deviations, lose the capacity for normal reproduction: the females lay much fewer eggs, and most of them are sterile at that. Other microorganisms and products induce a similar metatoxic effect in insects.

Consequently, when assessing microbiological products and comparing their effects to those of chemicals, one cannot limit oneself solely to the primary efficacy. One must add up all of the indices of effects: "antitoxicant" [2], teratogenic, contagious, deproductive, etc. Unquestionably, this overall effect will be incomparably greater than the primary effect, and thereby the advantages of the microbiomethod will increase.

Thus, one must study the ecological effect of microbiological agents on pests and, on this basis, develop rational and effective methods of using it in the integrated system of plant protection.

Development of the ecological approach to depression of pest population size should be pursued with due consideration of a specific region, as well as species-specific ecological distinctions of the pest, conditions under which it is deleterious and habitat range (chiefly, stability of habitats). Within the range of a pest, these conditions are not identical regionally, and this in turn affects the pathological and epizootiological process. Each of these factors has an enormous effect on the action of a pathogen and, consequently, efficacy of a method.

The geographic and climate distinctions of a region have a substantial influence on efficacy of the microbiological method, since manifestation of pathogenic properties of different groups of microorganisms is strongly dependent on temperature, humidity, insolation and other abiotic factors.

Effective methods of using microbiological products should be developed for each pest, with due consideration of susceptibility thereof to the pathogen, phenology, spontaneous infectiveness and deleteriousness. For example, the bacterial products that are presently in wide use, which are based on bacilli of the turingiensis group, can induce an epizootic process only in some (highly susceptible) insect species and under specific conditions that provide for development and spread of an epizootic.

Under other conditions, these products should be assessed according to their primary and metatoxic effects.

Bacteriodesiccant should be used in the range of fall-winter reservation of small Muridae, in haystacks, ricks, stacks of straw, forest strips, weeds, shrubs, etc. When rodents aggregate there, the most favorable conditions are created for development of an epizootic and, consequently, artificial introduction of a pathogen will yield the maximum effect. It has already been repeatedly noted that organization of bacterial extermination of rodents in the fall-winter habitats makes it possible to obtain the maximum effect with low expenditures. Extermination of the winter stock would

abviate the need for laborious extermination work over large areas in the summertime.

Investigation of spontaneous epizootics (viral, fungal, bacterial) and forecasting them in populations of numerous and harmful insect species merits particularly close attention of entomopathologists. All this is the basis for developing criteria for planning and implementing control measures. For the time being, such research is being pursued only at the All-Union Institute for Plant Protection on virosis of moths (T. A. Shekurina) and entomophthorosis of aphids (E. G. Voronina). But this is obviously not enough; studies must be expanded by involving outlying scientific institutions in the work, under the sole guidance of the All-Union Institute for Plant Protection.

All of the foregoing indicates that still do not have enough information to reliably assess the economic effect of pathogens when introduced on a mass scale into pest populations. It is imperative to widen the front of such research in different regions of our country, with the participation of institutes of the USSR Academy of Sciences and Union republics, as well as the All-Union Academy of Agricultural Sciences imeni Lenin, under the general supervision of and coordination by the All-Union Institute for Plant Protection. Of course, such work must be done primarily by qualified scientific personnel with the use of microbiological and entomological equipment. Accumulation and dissemination of such data would make it possible to refine significantly the technology of use of microbiological products for protection of plants and thereby aid in increasing the efficacy of these products, and speedy introduction into agriculture.

Finally, we should discuss another aspect of possible use of microorganisms and their metabolites to protect plants against rodents and insects. We refer to the future use of microbiological products that would have a preventive, rather than exterminating, effect. There are, first of all, repellents, "antifidants" and attractants; of course, these products must be of biological origin, i.e., they must be extracted from nature, where they exist on their own, participate in the cycle of matter and cannot accumulate in a specific environment and have an adverse effect on it. In animals and plants there are long-known substances that scare away their enemies. Microorganisms also produce the most diverse metabolites with the most varied properties, and unquestionably many of them have repellent, "antifidant" and attractant features for insects and rodents. However, heretofore science did not pay attention to this aspect of the problem. It is known, for example, that many insects and other animals are very sensitive to various odors: flies are attracted by decaying products, insects and parasitic ticks recognize the odor of animals, find them and invade them (Ixodes ticks, gad flies, horse flies, horn flies, mosquitoes, gnats, sand flies); moles recognize the odor of rain worms 1.5 m under ground; many plants scare off rodents with their odor or taste; admiral butterflies detect fermenting beech sap at a great distance, etc. Many of these odors are formed as a result of activity of microorganisms

(decomposition of plant and animal products). We succeeded in finding microorganisms with "antifilidant" properties in the Colorado beetle and lackey moth, repellent properties for the house mouse and common vole. It is imperative to continue the search for such microorganisms and develop rational methods of using them.
[657-10,657]

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AGROMETEOROLOGY AND PROTECTION OF HARVESTS

Moscow ZASHCHITA RASTENIY in Russian No 5, 1979 pp 34-37

[Article by L. A. Makarova, senior scientists at the All-Union Institute for the Protection of Plants]

[Text] Many years of experience in protection of plants revealed that the nature of development and reproduction of harmful organisms is largely determined by hydrothermal environmental conditions that regulate the distribution, number of generations, fertility and population levels, time of development and degree of harmfulness, necessity and time of institution of protective measures, etc. Many researchers have proven that environmental factors affect different aspects of vital functions of deleterious species. Now we must determine the closeness and stability of this correlation, the extent of effects of weather on deleterious organisms as related to the developmental distinctions of stricken crops, useful entomofauna and micro-organisms, the nature of their interaction and overall influence on distribution and number of pathogens.

Until recently, work on this problem was pursued by comparing the meteorological distinctions of different years and regions, most often on the basis of mean monthly indices of meteorological elements or comparison thereof to the norm over a period of many years. The obtained indices were mainly descriptive, and they did not offer an idea about the quantitative aspect of the correlation between deleterious species and their habitat. This made it difficult to detect the developmental patterns, evaluation of data covering many years, and it prevented use of modern analytic methods and processing using computers.

Testing of the principles of assessing natural resources, as it applies to problems of plant protection, revealed that they can only serve for a general description of the ecological situation. Determination of the significance of environmental conditions to different species became possible with the use of the agroclimatic method of investigation. In essence it consists of analyzing living conditions of living organisms on the basis of the actual stages of their development, with consideration of biology, ecology and correlations with feed plants, rather than calendar dates. As a result, determination is made of agrometeorological indices of the link

between deleterious species and condition of the environment at the main critical periods. The quantitative nature of these indices makes it possible to analyze objectively series of observations covering many years, to assess them statistically, to use mathematical methods to check the reliability of relationships and substantiate the possibility of making practical use thereof.

Agroclimatic studies have made it possible to define the role of different elements of the environment and combinations thereof in forming the complex of harmful species on agricultural crops, to determine the patterns of their behavior as related to hydrothermal conditions, to comprehend the mechanisms of their effect on the nature of settlement and dynamics of population size, to develop the principle of selection of the main factors with consideration of regional ecology of a species and the natural economic specifics of its habitats.

Such research is particularly important in forecasting development of pests. We refer, first of all, to many-year projections of dynamics of distribution and number of harmful organisms. It is based on division of territory into regions according to quality of natural conditions for survival and development of different species and complexes thereof, as well as degree of danger of mass outbreaks of pests and diseases. Efforts to use for these purposes the conventional schemes for meteorological and agricultural breakdown of regions showed them to be almost entirely unsuitable. For this reason, it became necessary to make a special agrometeorological breakdown of the territory. This is being done according to both the agrometeorological indices of the link between harmful species and the environment, and natural economic characteristics: area covered by crops that could serve as sites of reservation and settlement, correlation between different crops and cultivars, nature of development of stricken crops, etc. Analysis of territorial distribution of these indices enables us to comprehend the distinctions of geographic distribution of different species and to predict the routes of their subsequent migration. Estimation of recurrence of conditions that cause a rise and decline in number of harmful organisms makes it possible to determine the probability and incidence of mass reproduction in different parts of the habitat, as well as to single out regions with different degrees of damage done by pathogens. Agrometeorological division of areas has already been done for the turnip moth (I. S. Druzhelyubova, L. A. Makarova, 1972), Colorado beetle (V. N. Zharavlev, 1975), fruit fly (I. S. Shapiro et al., 1963), sting bug [*Eurygaster*], [*Eurygaster*] (G. M. Doronina, L. A. Makarova, 1976), as well as a number of the most deleterious diseases of grain crops and potatoes ("Methods of Territorial Multiyear Forecasts of Plant Diseases," 1971). Division of the territory into regions serves as the basis of complex regional [zonal] systems and rational planning of protective measures.

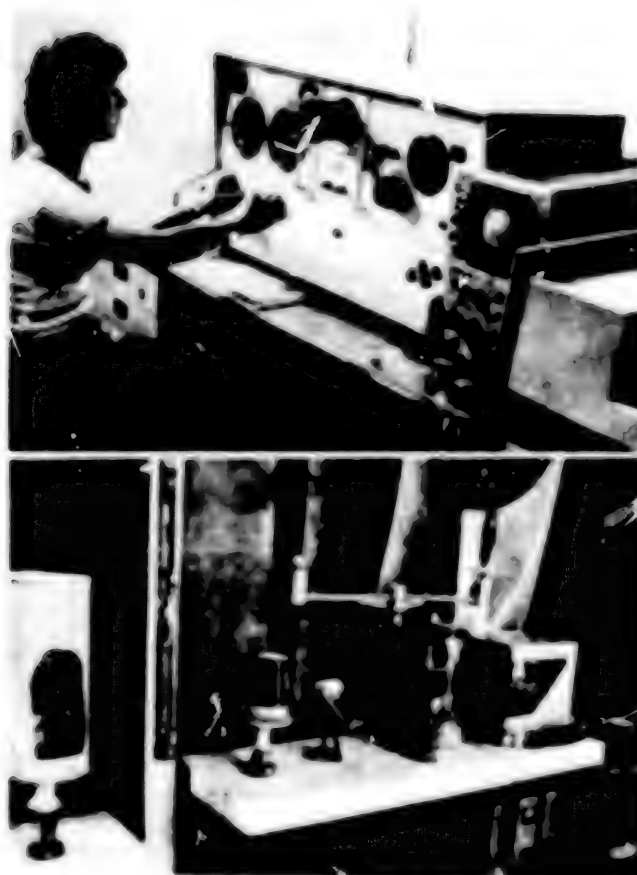
However, when preparing a long-term forecast, it must be borne in mind that the existing habitat ranges and deleterious zones cannot be considered stable. Intensification of agriculture, development of virgin and fallow land and

hydrological amelioration work lead to a change in ecological conditions of development of pests, dynamics of their migration and population size. About 25 million ha have already been dried and irrigated. But as yet, no more than 20-40% of the irrigated and 50-60% of the flooded land is used for agricultural crops, and this creates favorable conditions for broadening of the range and increase in number of pests. One must also take into consideration the possibility of a change in importance of different environmental factors. With increased specialization of agriculture the ecological situation is undergoing optimization as a result of expansion of plantings of vulnerable crops, which are often raised continuously, and extensive cultivation of varieties with high productive qualities. All this increases the viability of pests, improves their physiological condition and causes increased resistance.

In forecasting development of pests and diseases on an annual basis, consideration is given to the agrometeorological conditions of the preceding year, which determine the initial population size and physiological condition of hibernating populations and hence, the nature of their reactions to the environment in the following year. Such forecasts are defined in accordance with the hydrothermal conditions of the fall, winter and weather in the spring and summer of the current year. The significance of different periods and factors depends on the biological specifics of a species and dynamics of its reactions to changes in the weather.

Usually a factor that is at a minimum becomes the decisive one in controlling the population size: in northern regions this is the amount of warmth in the vegetation period, in southern regions the shortage and irregularity of precipitations, in eastern regions cold and snowless winters, etc. Thus, the intensity of reproduction of the turnip moth in northern regions is determined by the temperature. Favorable conditions for development of this pest are created in years with a warm and long autumn, when the sum of effective accumulated temperatures is at least 400° and mean temperature is at least 16°, during the period from mass flight of butterflies and hibernation of caterpillars. Under such conditions, the caterpillars conclude their intake of nourishment and begin to hibernate in a good condition. Subsequently, if there is prevalence of temperatures below 14° during the period from the start of spring activation of caterpillars to mass flight of butterflies of postwinter generations, the number of moths holds at the level of the previous year; at 14-16°, there is an increase in fertility and number of the pests; at above 16°, conditions are created for mass scale reproduction. In the case of optimum humidity in this zone, the amount of precipitations has an indirect effect, influencing development and degree of manifestation of fungal and viral diseases. Humidity conditions during the period of mass egg laying and development of young caterpillars of the first summer generation are of decisive significance in the forest-steppe and steppe habitats of the turnip moth. Profuse precipitations (GTK* above 1.5), as well as excessive drought (GTK less than 0.2) at this time induce significant death of eggs, retarded development of caterpillars and drastic weakening of the pest.

*GTK (hydrothermal coefficient) = $\frac{\text{sum of precipitations} \times 10}{\text{sum of active temperatures}}$



In the "Hydrometeorological Service" pavilion at the Exhibition of Achievements of the National Economy of the USSR.

Top: A. A. Skvortsova, senior radio engineer, receiving information from an artificial meteorological satellite
 Bottom: Automatic H-10 radiometeorological station

The research of recent years demonstrated the need for a differentiated approach to selection of forecasting criteria for different geographic populations of pests and pathogens. This is particularly important for species with a wide range that strike in different natural and economic regions. Zonal criteria have been established for the codling moth (A. S.

Degtyareva et al., 1969), turnip moth and bollworm (I. Ya. Polyakov et al., 1969), European cornborer (V. O. Khomyakova, 1969), flax flea beetle (N. A. Levin, 1969) and a number of diseases.

Hydrothermal conditions in the period of flight of bugs after hibernation, deposition of eggs and caterpillar hatching are the main factor determining the number of Eurygaster bugs in the southern range. Adverse situations are created when the mean temperature at this time is below 14° and GTK is above 1.0. Profuse torrential rains are particularly dangerous (GTK over 1.5), as they cause washing away and death of eggs. In the eastern regions, wintering conditions are of decisive significance, in particular, the number of 10-day periods with critical correlation between air temperature and height of snow cover. Forty or more such days (not necessarily in a row) freeze out a considerable number of hibernating bugs. Adverse weather during the "first flight--hatching" period are very seldom found there, and they are observed in years of drought, with GTK under 0.2. In the north of the range, the number of pests is limited by thermal conditions during the period of development of the new generation. Eurygaster bug nutrition at temperatures below 19° leads to weakening and decreased resistance thereof. Winter weather is of substantial significance: if it is cold with little snow, the bug and its main feed, winter wheat, freeze; in the case of unstable weather with frequent thaws and profuse precipitations, the hibernating bugs are stricken by fungal diseases, and the winter crops perish. All this lowers the size of the bug population and makes it necessary for it to feed on other crops, which leads to deterioration of physiological condition and viability.

The extent of effect of weather on dynamics of population size and damage done by pathogens depends on the original population density and condition thereof in the preceding year: it is the most effective during a period of increase in number. With a low population density, the beneficial environmental conditions aid in expanding the occupied areas and increase in number; with a high density, conditions are created for mass reproduction of the harmful organisms. During a depression, optimum weather conditions only improve the physiological parameters: the number of harmful organisms increases when such conditions recur for at least 2 years in a row. In the case of mass reproduction of the species, only extreme values of meteorological indices can disrupt the formed tendencies.

For making forecasts in the current year, the agrometeorological indices are used to determine the time of appearance and development of harmful species, determination of desirability and time of protective measures. The phenological forecast is made mainly from the temperature characteristics. Thus, the time of activation of hibernating specimens and primary infection of plants, start of hibernation and diapause are related to the dates that the temperature passes over specific ranges. Such a procedure has been developed for many species and it is used extensively, for example, in the control of fruit crop pests and diseases. At the same time, the levels of the indices may change for species with a wide range, depending on the

climate distinctions of a region and weather conditions during the year. For example, in the southern regions of the range of the Eurygaster bug, where there is prevalence of mild winters with little snow, the period of mass scale first flight of bugs after hibernation coincides with the time of a stable passage of ambient temperature through 12-13°. However, during years with extreme weather conditions in the winter (dust storms, drastic weather fluctuations, profuse snow), particularly in the second half of the winter, the bugs take their first flight only at a temperature of 14-15°. In the eastern part of their range, where the winters are cold and the soil freezes to a significant depth, active migration of the bugs to agricultural crops occurs after the air is stably warmed to 15° or higher (G. M. Doronina, L. A. Makarova, 1977).



In the "Hydrometeorological Service" Pavilion at the Exhibition of Achievements of the National Economy of the USSR

N. A. Tsarenkov, senior engineer by a facsimile duplicating machine that transmits weather maps

In the summertime, the time of development of harmful organisms is predicted from the sum of effective temperatures. This method has been widely introduced into practice. However, in different natural zones, the sums of temperatures change considerably, depending on the length of day, humidity, frequency of precipitations, temperature and amplitude of temperature fluctuation. It was established that the sums are rather stable only under optimum environmental conditions. This caused distrust and, at times, rejection of use thereof. For this reason, it was necessary to analyze the causes of instability of temperature sums and to propose methods of overcoming

it. First of all, one must take into consideration the living conditions of organisms in prior periods of their development. It was established that the time of oviposition and appearance of larvae of the Eurygaster but depend on wintering conditions. After a winter with normal hydrothermal conditions, the generation is hatched at a sum of effective temperatures of 200-210°; in the case of an unstable winter with sharp temperature fluctuations or dust storms, this happens at 240-250° and with a cold winter, at 280-290°.

Underestimation of effective heat that is stored during days of average daily temperature, close to the lower range of development of the species, and when it is below this range is the second cause of heterogeneity of sum of temperatures. Such days are usually not taken into consideration at all. Yet, during the daytime, the temperature of the air and particularly the soil oven rises above the threshold for development of the organism. Conversion tables and graphs have been proposed for consideration of this factor (T. S. Druzhelyubova, L. A. Makarova, 1969; I. P. Person, 1972), which permit more accurate calculation of phenology of harmful species, particularly in the spring and fall.

When determining the dates of summer development, particularly in southern regions, one must take into consideration the high temperatures above the thermal optimum (above 30-32°). They depress and retard development of living organisms, while the sums of temperatures accumulated in different periods and generation as a whole increase. An hourly count was proposed to determine this index (A. L. Shatskiy, 1939) and a correction factor was introduced (T. S. Druzhelyubova, L. A. Makarova, 1969). These procedures permit exact determination of the rhythm of development of organisms on agricultural crops and prediction of their deleteriousness.

In order to solve this problem, one must also predict the coincidence of times of appearance of the harmful stages with the most vulnerable stages of the plant. This has been developed comprehensively for diseases. It was shown that in the case of general phenological confinement of a pathogen to a host plant, the nature of coincidence of their critical periods changes in different years and regions, depending on the weather, and it serves as one of the chief causes of regional and seasonal variability of deleteriousness of diseases (K. M. Stepanov, 1962). This correlation is used to predict the degree of harmfulness of the turnip moth on cotton plants. The crop is the most vulnerable in the period between appearance of shoots to formation of the third pair of leaves, while the damage caused by the moths begins to be manifested from the time caterpillars of the middle and especially older ages appear. A method has been developed to determine the extent of expected damage of different crops and cultivars, with different planting times on the basis of sums of effective temperatures, with consideration of moisture content, and it also permits substantiation of the desirability and scope of extermination work (T. S. Druzhelyubova, L. A. Makarova, 1971).

In forecasting extent of harmfulness, it is important to take into consideration not only the average values of meteorological elements, but the nature of their distribution in time. Thus, the intensity of development of a disease with the same amount of precipitations depends on the frequency of the latter. It was established that if there are at least 60% rainy days and no more than 3-4-day periods without precipitation during the period of formation and maturation of wheat grain, the plants are severely stricken by wheat rust; there is moderate development of the disease when there are 40-60% days of rain with periods of 4-6 days without precipitation. In the case of rare precipitations (under 40%) and long periods without rain (over 7-8 days), there is mild manifestation of the disease (L. A. Makarova, 1972).

One must take into consideration the assortment of crops and cultivars that are raised, methods of cultivating them, distinctions of wintering and development, condition of plantings and possibility of change therein related to the expected weather. The set of these factors determines plant resistance to damage and their compensatory capabilities. There is more damage due to diseases and pests on weak plantings and crops. Thus, wheat is usually stricken by root rot on a mass scale when weather conditions restrict normal development of the crop and depress it. Intensive root rot disease of winter wheat is observed when there is prevalence of unstable weather following a cold or warm, but dry autumn, with frequent thaws followed by drastic temperature drops (to $-15-20^{\circ}$), with a negligible snow cover (0-5 cm). Common root rot of spring wheat spreads widely when there is an unstable moisture content of soil and reserve of productive moisture in the top meter layer during formation of grain under 60 mm and particularly under 40 mm (L. A. Makarova, I. I. Minkevich, 1977).

When scheduling protective measures, one must be informed about the expected weather conditions during the treatment period and immediately after it. Favorable conditions are created on days with stable, clear weather, high air humidity and profuse dew in the morning and evening hours, low wind velocity (no more than 2-3 m/s when dusting the crops and 4-5 m/s when spraying). If unstable windy weather is expected, with intermittent or torrential rains, it is inexpedient to perform treatment.

More recently, efforts have been made to use weather maps to schedule protective measures. It was established that they can be used to predict the intensity of development of brown and stem rust of wheat (I. P. Fadeyeva, L. N. Komissarova, 1971), phytophthora infection of potatoes (D. L. Tverskoy, A. V. Filippov, 1971) and long-distance migrations of harmful insects. In particular, it was shown that beet webworm moths migrate over long distances mainly when there is mass reproduction of this pest in close relation to synoptic processes. Anticyclone weather, with prevalence of calm, clear days with few clouds, with wind velocity of no more than 5 m/s, favors intensive ascent of the moths in the air. The first flight is usually observed at twilight or at night, when the air temperature near the ground drops to $12-13^{\circ}$, as well as around noon, at $30-32^{\circ}$ or higher. In view of the rare precipitations in the anticyclone system, there is retarded maturation of females, and in some cases it ceases.

Subsequent migration of the moths usually coincides with the direction of prevailing winds. They land when there is a cyclonic type of weather (temperature drop, considerable cloudiness, prolonged rains, mainly drizzles and steady rain). Such conditions restrict markedly migration of the beet webworm, cause it to concentrate significantly, speed up maturation of females and are favorable for subsequent development. For this reason, if one knows the meteorological conditions, one can predict with a sufficient degree of accuracy the probability and time of arrival of the pest in different parts of the country (G. K. Pyatnitskiy, 1936; A. N. Mel'nichenko, 1936).

In recent years, good communications have been established between the operational agencies of the Plant Protection Service and forecasting departments of the Hydrometeorological Service. As a result a system has been developed for forecasting migrations of the beet webworm, which can also be used for other species capable of extensive migration. It is based on data pertaining to the condition and size of pest populations, synoptic situation and prevailing winds in the regions of mass accumulation of moths in the preceding 10-15 days, as well as in areas of anticipated migration with due consideration of probable changes in the weather in the immediate future. Such forecasts were made at the All-Union Institute for the Protection of Plants in 1976 and 1977. They were submitted to the USSR and RSFSR ministries of agriculture, as well as All-Union Academy of Agricultural Sciences imeni Lenin, and they were taken into consideration in organizing protective measures.

It was also established that it is possible to use meteorological radar to fix mass scale migration of the beet webworm and determine the direction thereof, speed, duration and other parameters. This work will be done only upon request by the local agencies of the Plant Protection Service submitted to the administration of the Hydrometeorological Service.

The results of agrometeorological research are being used to find comprehensive solutions to problems pertaining to protection of plants. They are used to produce models of infectious processes and dynamics of number of deleterious species, to predict their condition and development, to plan and organize preventive measures. The chief principles and methods of agrometeorological evaluation of the environment have been summarized in methodological instructions intended for specialists in the Plant Protection Service ("Forecasting Development of Agricultural Crop Pests," 1975), while the indices of relationship served as the basis of recommendations on forecasting detection, distribution and number of the most dangerous pests and diseases. The practical use of these recommendations will make it possible to replace laborious inspections and records with simple estimations. The digital form of these characteristics permits formalization of base data, facilitates automation of long-distance transmission thereof and serves as the prerequisite for changing to mathematical forecasting.

The prospects of agrometeorological research on protection of plants are unquestionable. However, it is contained by the shortage of specialists

working in this field. For this reason, it is imperative to introduce this method on a wide scale in the work of scientific and industrial organizations that are concerned with the problem of protecting plants.
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A NEW VARIETY OF SOFT WHEAT

Dushanbe DOKLADY AKADEMII NAUK TADZHIKSKOY SSR in Russian No 12, 1978 p 44

[Article by F. G. Nigmatullin, Pamir Biological Institute, Tadzhik SSR Academy of Sciences]

(Text) Gornyy Badakhshan is one of the centers of diversification of liguleless forms of wheat. Liguleless analogs of soft wheat are presently known in 32 varieties. Fourteen new varieties of *eligulatum* soft wheat have been revealed and described in just the last few decades alone (1-4). However, liguleless analogs have not yet been completely revealed for all forms of soft wheat in Gornyy Badakhshan. A new liguleless form has been revealed among collections of seeds of the Bartangskaya expedition, planted in 1974 at the Ishkashimskiy Research Station. The diagnosis of this form is presented below:

T. aestivum, L. var. *quasiheraticum* Nigm. var. *nova*. Planta cum foliis eligulatis, spiculis, inflatis, pubescentibus, albis; caryopsis rubra.
A. *T. aestivum* L. var. *heraticum* Vav. et Kob. planta cum foliis eligulatis differt.

Typus: Tadzhikistania, Badachschan, Ischkaschim, 2600 m, statio experimentalis; VIII 1974, N 1423, F. G. Nigmatullin. Ischkaschimus statio experimentalis Institutis Biologici Pamirici conservatur.

T. aestivum L. var. *quasiheraticum* Nigm. var. *nova*. Liguleless plants, awnless, inflated, pubescent, white ears, red caryopses; a liguleless analog of *T. aestivum* L. var. *heraticum* Vav. et Kob., discovered and described back in 1928 (5).

Type: Tadzhik SSR, Gornyy Badakhshan, Ishkashimskiy Research Station, 2600 meters above sea level. Discovered in August 1974 by F. G. Nigmatullin, No. 1423; stored at the Ishkashimskiy Research Station, Pamir Biological Institute, Tadzhik SSR Academy of Sciences.

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[664-11004]

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ALCOHOLISM

UDC 616.89-008.441.13-036.12-02:616-056.7

HEREDITARY FEATURES OF ACETYLATION PROCESSES IN CHRONIC ALCOHOLICS

Minsk ZDRAVOOKHRANENIYE BELORUSSII in Russian No 7, 1979 pp 29-31

[Article by T. T. Sorokina, O. V. Liskovskiy, and P. S. Krivonos, Department of Psychiatry, Minsk Medical Institute, Republic Clinical Psychiatric Hospital, and Belorussian SSR Scientific Research Institute of Tuberculosis]

[Text] In addition to external factors, hereditary predisposition has significance to the arising and formation of chronic alcoholism. The role of hereditary predisposition has not been studied sufficiently.

We know that alcohol is subjected to acetylation processes in the body. The intensity of these processes is reduced in chronic alcoholics and alcoholic psychotics (1).

We studied hereditary polymorphism in relation to acetyltransferase in order to reveal the role of hereditary factors in the decline of acetylation processes in chronic alcoholics.

Polymorphism in relation to the enzyme acetyltransferase can be determined from the rate of inactivation of derivative preparations of isonicotinic acid hydrazide (INAH).

Acetyltransferase is represented in the population by two principal isoalleles at an autosomal locus exhibiting codominant inheritance (6).

In terms of the rate of inactivation of isoniazid, all people are divided into "slow" (weak) and "fast" (strong) INAH inactivators. "Slow" inactivators are homozygous in relation to the gene for slow inactivation, while "fast" inactivators are heterozygous or homozygous in relation to the gene for fast inactivation. "Slow" inactivators rather often exhibit psychoses coupled with polymorphic symptoms, dysthymic disorders, delirium, hallucinations, and beclouded consciousness (2,4,8,9).

The ratio between "fast" and "slow" isoniazid activators fluctuates within broad limits in different populations. Among Europeans, about half of the population falls into the "slow" isoniazid inactivator category (7,10).

The isoniazid inactivation rate of 113 chronic alcoholics (men) was determined in a narcological hospital. The control group consisted of 123 men with limited forms of infiltrative and focal pulmonary tuberculosis not suffering chronic alcoholism.

The intensity of inactivation processes was assessed from the concentration of the active fraction of isonicotinic acid hydrazide in daily urine following intake of a 0.6 gm test dose. The preparation's active fraction was determined by Wollenberg's method (1962) as modified by L. I. Grebennik (3).

Patients eliminating from 0 to 10 percent active INAH were treated as strong inactivators, those eliminating from 11 to 15 percent were treated as moderate inactivators, and those eliminating more than 15 percent were categorized as weak inactivators.

Chronic alcoholics were analyzed twice: in the first week after admission and prior to release following completion of a course of active treatment. Polymorphism in relation to acetyltransferase was determined twice to insure experimental purity.

It was considered in the analyses that arbitrary units of inactivation reflecting acetylation in the body could change in response to treatment (with antabuse), and that they could depend on the patient's clinical state. The technique we used permitted us to detect these changes. We also considered that 41 of the patients had been treated in the past with teturamin. Minor fluctuations (from 1 to 2 percent) were noted in the quantity of active INAH in daily urine prior to treatment with teturamin and following it, within the limits of the inactivation type. Statistical treatment of data acquired before and after treatment demonstrated statistical insignificance in the change experienced by isoniazid acetylation following antabuse therapy ($P > 0.05$). The obtained data indicate that the degree of inactivation does not depend on treatment, and that use of our technique does not influence acetylation.

Patients of the experimental and control groups did not receive preparations inhibiting INAH acetylation (PAS-C, sulfanilamides, salicylates). None of the patients had liver or gastrointestinal diseases.

The experimental group contained 20 patients 20-30 years old, 49 31-40 years old, 38 41-50 years old, and 17 patients over 50. The control group contained 38 patients 20-30 years old, 36 31-40 years old, 25 41-50 years old, and 24 patients over 50.

In the experimental group 72 of the patients (63.7 percent) were undergoing treatment for alcoholism for the first time, and 41 (36.3 percent) had undergone such treatment more than once.

Stage I chronic alcoholism was diagnosed for 10 patients of the experimental group, stage II was diagnosed for 101, and stage III was diagnosed for 2.

Twenty-nine patients had been abusing alcohol for up to 3 years, 6 had been doing so 11 to 15 years, and 3 patients had been abusing alcohol from 16 to 20 years.

The time of alcohol abuse and the age of the patients did not influence the isoniazid inactivation rate ($P > 0.05$). The families of 32 of the subjects exhibited a pattern of alcoholism (chronic alcoholism, alcoholic psychoses). Close relatives of four of the patients suffered mental illnesses; alcoholism was suffered by the fathers of 16 of the patients, by a brother or sister of 8 of the patients, by cousins of 3 of the patients, by an uncle or aunt of 5, by a grandfather of 6, and by the great grandfather of 1 patient. Chronic alcoholism was noted among two and even three relatives for six of the patients. Thus chronic alcoholism was present among 24 relatives in the nuclear families of the patients studied, and among 14 of their relatives once removed. Among 32 patients exhibiting a family pattern of alcoholism 23 were "slow" isoniazid inactivators, 2 were "moderate," and 7 were "fast." Sixteen of the patients in the experimental group had themselves suffered alcoholic psychosis (predelirium, delirium, hallucinosis). Out of the 16 patients who had suffered alcoholic psychosis 12 were "slow" isoniazid inactivators and 4 were "fast." The low number of observations did not permit us to make definite conclusions, but we can hypothesize that persons exhibiting genetically inhibited acetylation processes who are homozygous carriers of the gene for slow inactivation are more predisposed toward both chronic alcoholism and onset of alcoholic psychoses.

The 113 patients in the experimental group broke down in the following way in relation to the degree of INAH inactivation: 71 (62.8 percent) were "slow" inactivators, 13 (11.6 percent) were "moderate," and 29 (25.6) were "fast" inactivators.

The control group (123 patients) contained 56 (45.6 percent) "slow" inactivators, 25 (20.3 percent) "moderate" inactivators, and 42 (34.1 percent) "fast" inactivators.

The significance of differences in the distribution of "fast," "moderate," and "slow," INAH inactivators in the experimental group (alcoholics) and the control group (patients with pulmonary tuberculosis) was determined by the χ^2 test. Statistically significant dominance of "slow" INAH inactivators was demonstrated among chronic alcoholics in comparison with patients of the control group ($P < 0.05$).

Considering the fact that "slow" and "moderate" inactivators are carriers of the gene for fast inactivation (homo- and heterozygotes), the significance of this difference is even higher ($P = 0.01$).

In comparison with the alcoholic group, persons with the gene for fast inactivation are encountered significantly more frequently among patients with limited forms of infiltrative and pulmonary tuberculosis ($P < 0.05$).

Conclusions

1. There is a statistically significant dominance of "slow" (weak) INAH inactivators among chronic alcoholics in comparison with patients of the control group.
2. According to our preliminary data slow inactivators of isonicotinic acid hydrazide dominate among persons with a history of alcoholism in their families and among persons who had suffered alcoholic psychosis.
3. The degree of INAH inactivation does not depend on the age of the patient, the time of illness, and treatment.

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ALCOHOLISM

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HISTOCHEMICAL AND MORPHOLOGICAL CHANGES IN AN INJURED PERIPHERAL NERVE IN THE PRESENCE OF CHRONIC ALCOHOLIC INTOXICATION

Kiev VRACHEBNOYE DELO in Russian No 5, 1979 pp 66-69

[Article by T. I. Il'yash, Clinical Hospital No 7, Kiev]

[Text] Research on the pathogenesis of alcoholic polyneuritis continues to be a pressing problem. Successful control of this complication of chronic alcoholism would be impossible without revealing the morphological essence of the clinical manifestations of this pathology that is so difficult to treat.

In order to study the course of recovery processes in the presence of chronic alcoholic intoxication, we employed histological and histochemical methods for analyzing an operated nerve, spinal ganglia, lumbosacral segments of the spinal cord, and muscles of the thigh and shank of alcohol-intoxicated rabbits. The experimental method was as follows: Forty animals were subjected to neurotomy and subsequent neurography of the right sciatic nerve. Ethyl alcohol diluted with water (1:2) was introduced daily at a dose of 2.5-3.0 ml per kg body weight into the stomachs of 24 of these rabbits beginning on the day of neurotomy and ending the day that section material was sampled. The remaining 16 rabbits did not receive alcohol and served as the control group. Material for the histological and histochemical analyses was sampled on the 30th, 60th, and 120th days of observation. The histological material was processed by the classical Cajal-Favorskiy, Weigert-Pal', Van Gieson, and hematoxylin-eosin staining procedures. We used (Gomori's) method to determine cholinesterase and acid phosphatase, and alkaline phosphatase was analyzed by the (Kepiou-Monis-Kheykho) method (the azo combination method). Succinate dehydrogenase was determined by the (Nakhlas) method.

The experiments showed that chronic exposure to alcohol had an unfavorable effect on the course of destructive and restorative processes in the severed nerve.

Pathomorphological changes in the central segments of the right sciatic nerve and in the spinal segmental apparatus of experimental animals receiving alcohol turned out to be more profound. Utilization of breakdown products

in the peripheral segment of the operated nerve was noted to be inhibited. Regeneration of nerve fibers in these animals was noticeably weakened in the course of all observation times, in comparison with the characteristics of rabbits in the control group. Chronic alcoholic intoxication slowed down myelination of regenerating fibers. The degree of disturbance elicited by alcohol depended on the time of intoxication. As the time of action of the harmful agent increased, intensive and stable retrograde changes were observed, the reactive-proliferative activity of Schwann cells diminished more and more, and the difference in the intensity of regeneration in comparison with control animals at the same observation time was increasingly more distinct.

Experimental animals revealed a decline in the activity of acid phosphatase in the operated nerve at all observation times. Although the enzyme's activity in young nerve fibers was higher at the dissection point, it was significantly lower than in control animals. The activity of alkaline phosphatase in the operated nerve of alcohol-intoxicated animals was also lower than in control animals. Activity of this enzyme declined significantly in the walls of small blood vessels, especially capillaries, which is an indication that processes associated with transfer of metabolites across endothelial membranes of these vessels were weakening.

Many deformed neurons of reduced dimensions with acid phosphatase activity lower than control and surrounded by a broad, light pericellular zone were revealed in the anterior horns of the spinal cord by as early as the 30th day of observation. Diffuse localization of the enzyme was often revealed. Graininess was found to be irregular in deformed cells on the 60th day of observation (granules accumulated in some areas and were rare in others). Acid phosphatase activity was significantly lower in deformed cells than in control on the 120th day of intoxication. Some neurons exhibited diffuse localization of the enzyme coupled with its higher activity, indicating that autolysis was going on. High activity of acid phosphatase in control animals examined at the same observation time manifested itself as presence of granules, and only occasional deformed cells exhibited a diffuse distribution of lead sulfate precipitate.

The enzymatic activity of alkaline phosphatase in the bodies of neurons in the anterior horns of the spinal cord of alcohol-intoxicated animals was lower than that of control animals, especially on the operated side. On the 80th day of intoxication we revealed some deformed neurons exhibiting higher activity of this enzyme, surrounded by broad pericellular empty spaces.

Analysis for acetylcholinesterase in the anterior horns of the spinal cord revealed variations in the intensity of histochemical changes occurring in the synapses, especially on the right side. Neurons exhibiting low enzymatic activity, diffuse outlines, and diffusion of the enzyme into surrounding tissues were observed side by side with cells exhibiting high enzymatic activity. On the 120th day of intoxication cholinesterase activity was lower in the central section of the anterior horns on the operated side.

higher succinate dehydrogenase activity was noted concurrently with normally distributed (diformazan) granules in the motor cells of the spinal cord of animals in the control group. The deformed neurons of rabbits receiving alcohol exhibited a diffuse distribution of the diformazan precipitate. Enzymatic activity was reduced in wrinkled spindle-shaped cells.

Many deformed cells exhibiting high activity of diffusely located acid phosphatase and surrounded by an increased quantity of neuroglial components were discovered in the spinal ganglia of experimental animals on the 30th day of observation. On the 60th day the activity of this enzyme varied in different neurons of the spinal ganglia of experimental animals. Cells of average dimensions exhibited high enzymatic activity while that of small cells was low. The lead sulfate precipitate tended to diffuse in wrinkled neurons on the side of the operated nerve exhibiting high acid phosphatase activity. Many vacuolated cells with low enzymatic activity were detected. Acid phosphatase activity of control animals at the same observation time was somewhat higher, the enzyme took the form of granules, and much fewer altered neurons were noted.

In comparison with control (Figure 1a), acid phosphatase activity was noted to be low in the spinal ganglia of experimental animals on the 120th day of intoxication (Figure 1b). Significantly more cells were revealed in a state of destruction; the enzyme was diffusely localized, and the cells were surrounded by numerous reactively altered satellite cells.

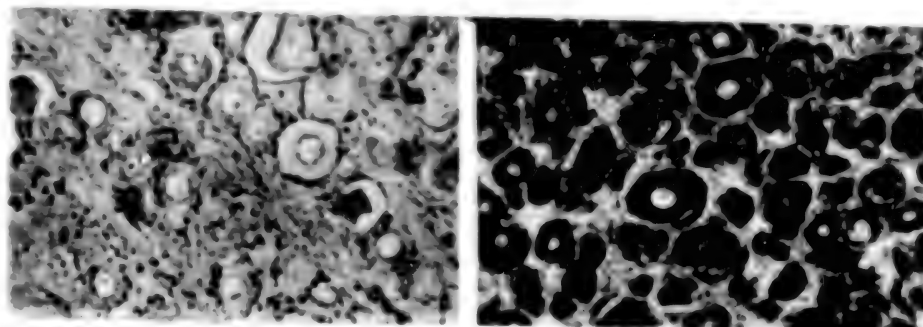


Figure 1. Acid Phosphatase Activity in the Eight Spinal Ganglia of Rabbits on the 120th Day of Observation: Processed by Gomori's method; objective--9, ocular--7; a--spinal ganglion of a control rabbit, b--spinal ganglion of a rabbit subjected to alcoholic intoxication for 120 days

Alkaline phosphatase activity in the spinal ganglia of experimental animals on the 30th day of observation was high in large, wrinkled and some vacuolated cells, and in the cytoplasm of average-sized neurons. In comparison with the control group of animals of the same observation time, on the 30th day of the research the enzyme's activity was generally lower, and it varied in different cells of the ganglion. Average-sized neurons exhibited the highest activity. The cytoplasm of large pseudounipolar cells exhibited weak activity, while their capsule exhibited high activity. There were numerous vacuolated neurons with high enzymatic activity on the operated side. On the 120th day of intoxication the activity of alkaline phosphatase decreased in the cytoplasm of neurons in both the right and left spinal ganglia, while the enzyme's activity was higher in the membranes of destructively altered cells. The enzymatic activity of acetylcholinesterase in spinal ganglia of animals receiving alcohol was lower, especially on the operated side. Deformed, wrinkled, and vacuolated cells were typified by low activity for this enzyme.

A dramatic difference was revealed in the activity of succinate dehydrogenase in different neurons of the spinal ganglia. On the 120th day of intoxication we observed a decrease in the enzyme's activity in the central sections of the ganglion, and a certain increase in activity in parts of neurons in the periphery of the ganglion, which exhibited a diffuse localization of the enzyme.

Acetylcholinesterase was revealed in muscles of experimental animals in striated, flattened, and deformed synaptic plates exhibiting varying enzymatic activity (high, moderate, and low). The muscles of control animals revealed only occasional altered synaptic components. There were more capillaries with higher alkaline phosphatase activity, especially on the operated side, than among rabbits receiving alcohol.

Analyzing the data obtained from research on destruction and regeneration of the sciatic nerve in the presence of chronic alcoholic intoxication, we can conclude that poisoning by alcohol aggravates the course of dystrophic changes and destructive processes, retards nerve regeneration, and leads to an increase in dystrophic changes in the operated nerve, in higher structural levels of the nervous system, and in muscles. In comparison with control, the destructive changes caused by alcohol were not as considerable on the operated side as on the operated side in the spinal cord, spinal ganglia, and muscles of experimental animals. It follows from this that uninjured tissues are more resistant to the harmful influence of alcohol than are those in a state of destruction and regeneration.

(198-11004)

DATE: 1977; VOLUME: 30, 1979

EARLY DETECTION OF TOXIC LESIONS TO OPTIC NERVES

Odessa OPTAL'MOLOGICHESKIY ZHURNAL in Russian No 4, 1979 pp 223-225

[Article by I. L. Gol'dovskaya, candidate of medical sciences, Institute of Psychiatry, USSR Academy of Medical Sciences, submitted 12 Jun 78]

[Text] Toxic lesions to optic nerves occur primarily in the form of retrobulbar neuritis with involvement of the papillomacular bundle and less often, as perineuritis with impairment of peripheral vision (A. S. Novokhatskiy, 1973). The symptoms thereof, as well as of other diseases of optic nerves, include, in most cases, impairment of color perception. Several authors stress that disorders referable to color perception, which is one of the most refined and labile functions of the visual analyzer, may be an early sign of toxic lesion to optic nerves (Frandsen, 1962; V. N. Marinchev, 1963; Bouniq and Coscas, 1966; Saraux et al., 1966; Saraux, 1975).

In view of the fact that there are few such reports and that the nature of color perception disorders has not been studied in sufficient detail, we deemed it possible to submit the results of our studies, which confirmed that acquired disturbances of color perception may be the first or only symptom of toxic amblyopia.

We had 28 patients under observation with toxic lesions to optic nerves, which were detected upon testing of color perception using the polychromatic tables of Ye. B. Rabkin (8th and 9th editions). The patients ranged in age from 28 to 50 years; there were 25 men and 3 women. The process was unilateral in two cases and bilateral in the others, but severity thereof varied in half the cases. All of the patients were undergoing treatment as inpatients at the First Clinical Psychiatric Hospital imeni P. P. Kashchenko and Psychiatric Hospital No 16 in Moscow. Most of them (20) suffered from chronic alcoholism or schizophrenia complicated by alcoholism. In eight cases, the toxic lesions to optic nerves developed during administration of therapy with drugs known to have a possible side-effect on the optic nerves (Gillespie et al., 1959; Carr and Henkind, 1962). Three patients with manic depressive psychoses were given antidepressants referable to the group of monoamine oxidase inhibitors, while five patients with schizophrenia and concomitant tuberculosis of the lungs were given the tuberculostatic agent, ethambutol.

Only 6 of the 28 patients complained of impaired color perception and 4, of impaired vision. Subjectively, the color perception disorder was manifested by difficulty or inability to distinguish red and green; these colors were perceived as gray or pale. But most patients (18) presented no complaints referable to vision, and the disturbances of color perception were detected only upon objective examination. They varied significantly in severity. In the presence of mild color perception disorders, which are referable to the threshold according to the classification of Ye. B. Rabkin et al. (1976), the patients could not read 4-7 tables in the series, and in the case of severe disorders they could not read a single one. The disturbances of color perception were similar to the congenital type, usually resembling deuteranomaly, and in only isolated cases they resembled protanomaly. It is expressly the form of these disturbances, referable to the red-green axis of color vision, that made it possible to first detect these acquired disorders using the polychromatic tables designed for diagnostics of congenital color perception pathology. The atypical nature of some of the patients' answers caused us to suspect that the disorders were acquired. They were never as clearcut as in the case of congenital deuteranomaly, and when tests were repeated several times they changed in both directions. The pigment tables of Ye. B. Rabkin (2d edition) and the AK-50 anomaloscope were used for more definite differentiation between acquired and congenital pathology. The most demonstrative finding was elevation of color thresholds, which was limited to the thresholds for red and green in only isolated cases and usually applied to all colors but to different extents. The last series of pigment tables revealed a decline of functional stability of chromatic vision varying in degree (Ye. G. Sokolova, 1955). With the anomaloscope, the patients usually took more than normal amounts of green to form the equation of Reley, like deuteranomalous individuals, but these data, like the answers for the polychromatic tables, were variable and inconsistent. In the presence of mild disorders of color vision, the patients perceived the normal Reley equation, but had difficulty finding it a second time. A typical distinction of acquired color vision pathology was consistently observed in the anomaloscopic study: the patients correctly named colors, without making the major errors inherent in individuals with congenital color vision pathology.

Ophthalmological examination also revealed other disturbances of visual functions in 17 out of the 28 patients. Diminished visual acuity by more than two-tenths, combined with concentric narrowing of the visual field or scotoma, and varying degrees of pallor of the optic nerve disk, was observed in seven patients (including both cases of unilateral involvement of optic nerves). In four cases, acuity and optic nerve disks remained normal, but campimetry revealed central, paracentral or eccentric scotomas for white and colors, while scotomas or concentric narrowing of the visual field for only red or green, or both these colors, were demonstrated in six other patients with intact visual acuity and unchanged ophthalmological findings. In 11 cases, comprehensive campimetry failed to demonstrate defects in the visual field; the acquired color perception disorders were the only signs of toxic lesion to optic nerves. These patients included 9 individuals with chronic alcoholism and 2 who were taking ethambutol.

All patients with alcoholic lesions to optic nerves presented symptoms of intoxication referable to the central and peripheral nervous systems, and internal organs (alcoholic polyneuritis, alcoholic encephalopathy, repeated alcoholic delirium, cirrhosis of the liver, etc.). As for the group of patients with drug-induced lesions to the optic nerves, this was the only symptom of intoxication, with the exception of one case: acutely developing unilateral retrobulbar neuritis, against the background of ethambutol therapy, was a manifestation of drug disease, and it was associated with severe toxic-allergic hepatitis and neurological disorders.

A dynamic follow-up was pursued on 25 of the 28 patients. Treatment consisted of withdrawal of the etiological factor (alcohol, antidepressants, ethambutol) and complex vasodilating, tissue and vitamin therapy. There was total restoration of visual functions in 18 cases and improvement in 3. In four cases, in spite of the therapy, there was development of partial or total atrophy of optic nerves (in one patients with toxicallergic reaction to ethambutol and in 3 with alcoholic amblyopia detected at a very advanced stage). In cases of drug lesions to optic nerves, restoration of visual functions occurred 2-12 days after discontinuing the drug and instituting therapy; in cases of alcoholic lesions, it occurred within 1-4 weeks, depending on the stage of the process.

When clinically marked cases of optic nerve lesions were found (with changes in acuity and field of vision, pallor of optic nerve disks), differential diagnostics were pursued to differentiate between pathology of optic nerves caused by a brain tumor or other organic lesions to the central nervous system.

The nine cases of alcoholic retrobulbar neuritis with only one symptom, impairment of color perception, present particular diagnostic difficulty. On the one hand, the absence of any defects in the visual field requires thorough differentiation from congenital pathology of color vision. On the other hand, one cannot fail to take into consideration the numerous data in the literature concerning color vision defects inherent in chronic alcoholism (S. Z. Pashchenkov et al., 1974). However, although the nature of the color perception defects found in some patients with chronic alcoholism was not established (special genetic, or consequence of cirrhosis of the liver), all of the authors were unanimous in identifying them: color perception disorders related to chronic alcoholism pertain to the blue and yellow parts of the spectrum, i.e., they are not inherent in lesions to optic nerves and cannot be detected with the use of polychromatic tables.

Thus, evaluation of color perception disorders in the nine patients with chronic alcoholism as the first and only symptom of chronic retrobulbar neuritis is sufficiently well-founded: 1) the disturbances of color perception resemble the congenital type: deuteranomaly, which is typical of optic nerve lesions; 2) in patients with clinically marked forms of alcoholic amblyopia (changes in visual field, pallor of optic nerve disk), the form of color vision disorders is analogous, and they only differ in severity; 3) there is complete regression of color perception disorders after treatment.

Consequently, acquired disturbances of color perception, of the deuteranomaly type (and less often protanomaly), both in chronic alcoholics and in patients submitted to certain forms of therapy, can be justifiably considered as latent forms, the first manifestations of toxic lesion to the optic nerves. These color perception disorders pertain to the green and red parts of the spectrum; they are atypical and characterized by vague answers on the polychromatic tables, as well as elevation of all color thresholds, decrease in functional stability of chromatic vision, anomalous but inconsistent Reley equations without gross mistakes in naming colors and, in some cases, asymmetry of symptoms in the two eyes. These elements distinguish them from genetically determined disturbances of color perception. In future studies of this pathology, it may be of definite interest to use the Farnsworth 100-shade test, the value of which in detection of early stages of alcoholic dystrophy of optic nerves is indicated by Bouniq and Cascas, 1966.

The initial disorders of color perception in chronic alcoholics should be used by physicians for extensive health education work as well: impairment of color perception is graphically demonstrated to the patient and interpreted as a threat of total blindness and, not infrequently, of loss of occupation.

Conclusions

1. Color perception disorders may be the early symptoms of toxic lesion to optic nerves in its latent form (alcoholic and drug etiology).
2. These color perception disorders are similar to the congenital type resembling deuteranomaly and, less often, protanomaly, but differ from the latter in vagueness and variability of symptoms.
3. The nature of color perception disorders complicates differential diagnostics of congenital color perception pathology, on the one hand, and makes it possible for early detection of toxic lesion to optic nerves by means of the most accessible method to a practicing physician, polychromatic tables, on the other.
4. Most toxic lesions to optic nerves that are detected at the early stage are reversible and respond well to therapy provided the etiological factor is eliminated.

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[655-10,657]

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BLOOD GROUPS OF THE ABO SYSTEM IN INDIVIDUALS SUFFERING FROM ALCOHOLISM
AND ALCOHOLIC PSYCHOSES

Minsk ZDRAVOOKHRANENIYE BELORUSSII in Russian No 6, 1979 pp 43-44

[Article by T. T. Sorokina and O. V. Liskovskiy, Department of Psychiatry,
Minsk Medical Institute, submitted 12 Jun 78]

[Text] Investigations of blood groups in families and of their frequencies in different populations has shown that the ABO groups are inherited and are determined by three alleles at one locus in accordance with Mendel's law. Alleles A and B are codominant when they combine in the AB genotype, but each of them dominates over allele O in heterozygous combinations.

According to information reported by G. Harris (1973) the group specificity of A and B is determined by the terminal sequences of sugars.

The ABO system--the main system of biochemical inherited polymorphism in man--is the most studied genetically and clinically and it is of cardinal importance for an understanding of the role of biochemical polymorphism in clinical pathology.

According to information in the literature the ABO groups have been studied in different diseases, including in persons suffering from chronic alcoholism. Thus, it has been established that predominantly persons with blood group O (I) suffer from gastric and duodenal ulcers, plague and cholera; persons with blood group A (II) --with pox, malignant tumors at different sites, pernicious anemia, chronic pulmonary tuberculosis. The data in the literature on the association of the ABO blood groups with chronic alcoholism are contradictory. Thus S. H. Nordmo (1959) demonstrated a significant association of blood group A (II) with alcoholism in 939 alcoholics in Pueblo, Colorado, while E. Achte (1958) found no such dependence. F. E. Camps (1971) detected a statistically significant increase in secretors with blood group A (II) in 1800 alcoholics compared with the controls. T. P. Konstantinova (1973) found no differences in the blood groups of patients with alcoholism and healthy individuals. In a study of 507 patients with alcoholism (407 men and 100 women) N. I. Akhmina et al established that in individuals with blood groups AB (IV) and B (III) to whom antigen B was common, the possibility

of falling ill with alcoholism is approximately two times higher than in carriers of other antigens of the ABO system, provided that alcoholism had been present in relatives of patients with these blood groups.

We studied 270 hospitalized male alcoholics and 150 male non-alcoholics. The groups being compared were identical in sex and age.

ABO blood typing was accomplished using the standard hemagglutinating sera produced in our country. The distribution of ABO blood types in healthy males according to our data was close to the results of other authors for residents of Belorussia (I. I. Salivon et al., 1976).

The basic clinical characteristics of the investigated group of patients were as follows: Of 270 examined stage II alcoholism was noted in 238; stage I in 19, and stage II in 13 persons. A family history of alcoholism was reported in 78 patients (28.8 percent); for 54 of them there was alcoholism in relatives of the first degree of consanguinity. Eighty-two patients (34 percent) had had alcoholic psychoses. In 17 of them psychosis was repeatedly observed. In most of the patients the alcoholic psychosis took the form of delirium tremens. Twenty-three patients (28 percent) of those who had had alcoholic psychoses had a family history of alcoholism.

When the data of examination of the sick and healthy individuals were compared, we detected no significant differences in the distribution of blood groups of the ABO system. We noted only a certain tendency to a decrease in the number of persons with blood group A (II) and an increase in the number of persons with groups B (III) and AB (IV).

This redistribution was more distinctly noted in comparing patients with a family history of alcoholism ($\chi^2=3.0453$, $P>0.05$) with patients unrelated to alcoholics (table).

Distribution of ABO Blood Groups in Healthy Individuals and Chronic Alcoholics

		Blood Groups			
Groups Compared		O (I)	A (II)	B (III)	AB (IV)
Alcoholics (n=270)		87	101	62	20
Control Group (n=150)		53	58	31	8
Subgroups of Alcoholics	With alcoholic psychoses (n=82)	22	24	22	11
	Without history of psychoses (n=188)	65	77	40	9
	With family history (n=78)	24	28	19	7
	Without family history (n=192)	63	73	43	13

The indicated differences confirm the results of investigations conducted by S. I. Akhaisa et al. (1975). The higher significance of the differences obtained by those investigators is explained by their having compared a greater number of groups under investigation.

The differences in the redistribution of blood-groups were most significant in persons having undergone alcoholic psychoses ($\chi^2=9.491$; $P<0.025$).

According to our data the differences in blood-groups in persons having undergone alcoholic psychoses in comparison with healthy individuals and alcoholics without psychoses proved to be significant.

Blood groups B (III) and AB (IV) predominate in patients with alcoholic psychoses. Patients with blood groups B (III) and AB (IV) are predisposed to psychoses to a greater degree than patients with blood groups O (I) and A (II).

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INVESTIGATION OF THE EFFECTS OF SOME ANTIBIOTICS OF THE PENICILLIN CLASS
ON BRUCELLA PROPERTIES

Moscow ANTIBIOTIKI in Russian No 6, 1979 pp 454-458

[Article by O. V. Kondrat'yeva, V. M. Stepanov and N. P. Medvedenko, Central Asiant Scientific Research Institute of Plague Control, Alma-Ata, submitted 22 Jan 79]

[Text] The problem of drug resistance of pathogenic microorganisms is the constant concern of clinicians, epidemiologists and microbiologists, in view of the wide use of antibiotics for the treatment of infectious diseases. Bacteria with multiple drug resistance, as well as those resistant to one specific antibiotic, are the subject of intensive investigation. It was demonstrated that increase in antibiotic resistance is associated, in a number of cases, with a change in morphological, biochemical, phagolytic, antigenic and other features of microorganisms [1-3].

The wide use of antibiotics as one of the chief elements of complex therapy of patients suffering from brucellosis, as well as use thereof in veterinary practice, may cause appearance of drug resistant forms of Brucella. At the same time, quite a bit of information has been accumulated in the literature about cases of isolation of Brucella strains with altered characteristics, which made it difficult to identify them. Perhaps, the appearance of such strains is attributable to the effects on them of different environmental factors, including antibiotics. This thesis was confirmed in the experimental studies of a number of authors. Thus, V. S. Urалева [4, 5] indicates that there are significant changes in the main properties of Brucella as a result of acquiring resistance to different antibiotics. As compared to the initial strains, antibiotic-resistant Brucella strains presented changes in serological properties, reduction capacity with regard to stains, urease activity, phagolyzability. M. A. Mirzayeva [6-8] reports significant changes in biological characters determining the Brucella biotype.

Our objective here was to determine the role of antibiotics in the penicillin group in change of properties of different types of Brucella.

In the available literature, we encountered only data on the effect of penicillin on Brucella properties, and none pertaining to the effects of semisynthetic penicillins on these microorganisms.

Material and Methods

We used both benzylpenicillin and semisynthetic antibiotics of the penicillin and cephalosporin groups, ampicillin and cephalexidine (ceporin) to determine the effects of penicillins on the properties of *Brucella*. In the experiments, we used reference strains - *Br. melitensis* 16-M, *Br. abortus* 344, *Br. suis* 1330--and cultures isolated from patients in Kazakhstan in 1977--*Br. melitensis* 100 and *Br. melitensis* 74. These strains, with the exception of the last mentioned, were typical of their species in all differential diagnostic characters. Strain 74, the population of which consists of R cells, has all the features of dissociated strains of *Brucella* (positive trypanflavine test, agglutination only with anti-R serum). At the same time, this strain grows well on ordinary nutrient media and media with stains (fuchsin and thionine). A small percentage of cells in the R form was found in the population of strain 100, but this did not affect its differential diagnostic properties. The strains used in the experiment presented different degrees of resistance to the above-mentioned antibiotics. Thus, *Br. abortus* 344 and *Br. suis* 1330 were highly sensitive to the tested agents (minimum bactericidal dose 5 µg/ml). *Br. melitensis* 16-M and 100 were rather resistant to benzylpenicillin and grew with a 20 µg/ml concentration thereof in the medium; ampicillin and ceporin retarded growth of these strains in a concentration of 5 µg/ml.

In order to obtain stable forms, the tested strains were submitted to passages in semiliquid (0.7%) liver agar with increasing concentrations of antibiotics. Under these conditions, antibiotic-resistant strains appeared quite rapidly. Three to five passages were required to obtain the altered forms, depending on the species of strain. Antibiotic-resistant variants developed more rapidly for representatives of the species *Br. melitensis* and more slowly for *Br. abortus* and *Br. suis*. Thereafter, we worked with liver agar of the usual consistency. We studied cell morphology of all antibiotic-resistant *Brucella* mutants obtained, by means of phase contrast microscopy, as well as nature of growth on liquid and solid nutrient media, hydrogen sulfide production and stain reducing capacity (fuchsin, thionine), agglutinability with *Brucella* sera, sensitivity to *Brucella* phage Tb and antibiotics. *Brucellacin* production was studied by the method of Fredericq [9]. *Br. neotomae*, which we selected from the collection of standard strains, served as the indicator culture. The initial strains served as a control in the study of mutant properties.

We tested the virulence of some antibiotic-resistant mutants by infecting guinea pigs with different doses ($2 \cdot 10^5$, $2 \cdot 10^6$, $2 \cdot 10^7$ bacterial cells per ml). Three guinea pigs were infected with each dose. The animals were sacrificed 17 days after infection. The obtained subcultures were examined for the above-mentioned properties.

Results

The table shows that all of the strains used in the experiment presented typical properties before passages in media with antibiotics, with the

Results of testing properties of antibiotic-resistant *Brucella* mutants

Strain	Resistance to antibiotics	Agglutinability by serum			Production of		Growth on media with		Lysis by Tb phage	
		anti-abortionus	anti-melitensis	anti-R	hydrogen sulfide	brucella cin	fuchsin	thionine	RTD	10 ³ •RTD
Br. melitensis 16-M	Initial	—	+	—	—	+	+	+	—	—
	Benzylpenicillin-resistant	4/3	4/1	4/0	4/1	4/1	4/4	4/3	4/3	4/3
	Ceporin-resistant	3/3	3/0	3/0	3/1	3/0	3/3	3/3	3/3	3/3
	Ampicillin-resistant	2/1	2/0	2/1	2/0	2/0	2/2	2/2	2/1	2/1
Br. abortus 544	Initial	+	—	—	—	+	+	—	+	+
	Benzylpenicillin-resistant	3/0	3/0	3/3	3/0	3/0	3/3	3/0	3/0	3/0
	Ceporin-resistant	2/0	2/0	2/2	2/0	2/0	2/2	2/0	2/0	2/0
	Ampicillin-resist.	2/0	2/0	2/2	2/0	2/0	2/2	2/0	2/0	2/0
Br. suis 1330	Initial	+	—	—	+	—	—	+	—	+
	Benzylpenicillin-resistant	3/3	3/0	3/0	3/2	—	3/3	3/3	3/1	3/3
	Ampicillin resist.	2/2	2/0	2/0	2/2	—	2/2	2/2	2/0	2/0
Br. melitensis 74	Initial	—	—	+	—	+	+	+	—	—
	Benzylpenicillin-resistant	2/0	2/0	2/2	2/0	2/0	2/2	2/2	2/0	2/0
	Ampicillin-resist. Ceporin-resistant	3/0 2/0	3/0 2/0	3/3 2/2	3/0 2/0	3/0 2/0	3/3 2/2	3/3 2/2	3/0 2/0	3/0 2/0
Br. melitensis 100	Initial	+	—	—	—	+	+	+	—	—
	Benzylpenicillin-resistant	3/0	3/3	3/0	3/0	3/0	3/3	3/3	3/0	3/0
	Ampicillin-resistant Ceporin-resistant	2/1 2/2	2/0 2/0	2/2 2/0	2/0 2/0	2/0 2/0	2/2 2/0	2/2 2/0	2/1 2/0	2/2 2/0

Note: The number of tested strains is in numerator and number of strains with positive result in test used is in denominator.

exception of strain 74 in the R form. There were changes in a number of important differential properties of *Brucella* under the influence of benzylpenicillin, ampicillin and ceporin. Thus, most penicillin resistant mutants of *Br. melitensis* 16-M lost the capacity to be agglutinated by anti-melitensis serum, acquiring the capacity for agglutination by anti-abortionus serum and lysis by Tb phage; one of the ampicillin resistant variants was found in a dissociated state. A change to the R form was also noted in all

antibiotic-resistant strains produced from Br. melitensis 10-97 they were lysed by Tb phage, agglutinated only with anti-B serum, and they grew in growth with formation of a sediment. The serological characteristics of ampicillin- and benzylpenicillin-resistant Br. suis 1330 mutants did not change, but unlike the original strain they acquired the capacity to grow on medium with fuchsin. One benzylpenicillin-resistant strain became more sensitive to Tb phage and was lysed by it in a high dilution. No ceporin-resistant variants were obtained from strain 1330.

Some interesting changes were demonstrated in the ampicillin-resistant mutants obtained from Br. melitensis 100. Although these mutants presented all of the signs of dissociation and White-Wilson staining revealed that the population thereof consisted of R cells, they were well-lyzed by undiluted Tb phage, and one of them also by diluted phage (see Table). The benzylpenicillin-resistant variants obtained from this strain were found to be in the S form; they had lost the original strain's capacity to agglutinate with monospecific anti-abortion serum, and they began to be agglutinated by monospecific anti-serum.

We failed to demonstrate changes in nutrient requirements of the obtained mutants with resistance to antibiotics of the penicillin group when cultured on synthetic media of a specific chemical composition, which is indicative of the great differential value of this character, particularly when studying atypical strains.

Studies of the bacteriocin-producing capacity revealed that all of the original strains, with the exception of Br. suis 1330, formed distinct zones of retardation of growth, 10-15 mm in diameter, of the indicator strain. Repeated checking of this property in antibiotic-resistant strains was indicative of total loss thereof.

Studies of cell morphology on smears of antibiotic-resistant mutants revealed that cultures incubated in semiliquid agar in the presence of antibiotics presented, along with normal cells, a significant number of altered spherical cells arranged in chains. Isolated filamented cells were observed in the medium with ceptin. Altered cells were not demonstrable in smears upon subsequent transfer to ordinary media.

Investigation of mutant sensitivity to other antibiotics revealed significant changes, as compared to the strains from which they were obtained: all of the mutants acquired resistance to tetracycline, chlorotetracycline and some of them, to levofloxacin. There was retention of sensitivity to streptomycin.

The host properties were studied in benzylpenicillin-resistant mutants of strains 10-97 and 1169, ceporin-resistant variant of 10-97 and ampicillin-resistant variant of 1330. We found that their virulence was drastically attenuated. Thus, while the original strains of these cultures induced generalized infection in guinea pigs given a dose of 20 bacterial cells, their benzylpenicillin-resistant variants in a dose of 20,000 bacterial cells

induced only local infection, while the same dose of the ceporin-resistant 16-M mutant and ampicillin-resistant variant of 1330 did not survive in experimental animals. The acquired characters were retained in the benzylpenicillin-resistant variants submitted to passages in guinea pigs.

Thus, the results of these studies indicate that there is profound variability of the main properties of *Brucella* in the course of their acquisition of resistance to antibiotics in the penicillin and cephalosporin group. Not only the type of antibiotic, but of *Brucella* was significant in this. Thus, it was possible to obtain rather rapidly benzylpenicillin-resistant variants of *Br. melitensis* 16-M, 100 and 74. Already after 3-4 passages, there was a 400-fold increase in resistance of these strains to benzylpenicillin, i.e., it reached 5000 µg/ml. There was slow increase in benzylpenicillin resistance of *Br. abortus* 544 and *Br. suis* 1330, and resistant mutants were obtained only after the 10th passage in semiliquid agar. The build-up of antibiotic resistance of *Br. abortus* 544 was associated with a change to the dissociated state. There were also signs of dissociation in all of the ampicillin-resistant variants of strain 100 and one ampicillin variant of *Br. melitensis* 16-M.

The submitted data indicate that *Brucella* acquires resistance to benzylpenicillin rather easily, and it reaches a significant degree. It is more difficult for *Brucella* to acquire resistance to ceporin and ampicillin. It is extremely difficult to differentiate between antibiotic-resistant strains of different species of *Brucella* using the ordinary tests. Under these conditions, determination of the bacterial requirements with regard to growth factors is particularly valuable; it permits differentiation of typical [10, 11] and, according to the above findings, altered strains.

It is of considerable clinical interest that benzylpenicillin-resistant strains develop resistance to tetracycline and, in a number of cases, to levomycetin.

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POSSIBILITY OF PREDICTING HYPERCHOLESTEROLEMIA IN PILOTS

Kazan' KAZANSKIY MEDITSINSKIY ZHURNAL in Russian No 3, 1979 pp 18-20

[Article by M. P. Vavilov, candidate of medical sciences, Central Order of Lenin Institute for Advanced Training of Physicians, Moscow, submitted 20 Oct 78]

[Text] Abstract: A study was made of the correlation between incidence of hypercholesterolemia of ≥ 6.45 mmole/l and age, mean annual flying time, job category, class qualification and flight specialty of 300 pilots. A calculation was made of coefficients of likelihood of hypercholesterolemia. A rating table was developed, which makes it possible to correctly forecast the risk of hypercholesterolemia in 84% of the cases and to apply a differentiated approach to primary prevention of atherosclerosis in pilots.

Key words: pilots, prediction of hypercholesterolemia.
There are 3 tables.

Atherosclerosis is in one of the first places among different nosological forms of cardiovascular pathology as the cause of disqualifying flight personnel.

Most researchers agree that hypercholesterolemia is of first and foremost significance in development of ischemic disease of the heart (atherosclerosis). Statistical analysis of data obtained as a result of studying the link between cardiac ischemia and cholesterol level made it possible to make calculations, according to which a 15% decline of cholesterol level in blood should lead to a 35% decline in incidence of new cases of ischemia.

The role of hypercholesterolemia in development of atherosclerosis determines the main routes of prevention thereof. For this reason, in order to predict fitness of pilots, as well as to screen groups of pilots requiring an in-depth examination and primary prevention of atherosclerosis, blood cholesterol levels are quite important. Since biochemical tests of blood serum are rather laborious and require that a pilot interrupt his training, the prospect of individual forecasting of hypercholesterolemia in pilots on the basis of questionnaire data, without direct biochemical tests, is quite valuable.

We examined the case histories of 300 pilots, who had undergone a complete clinical work-up at the hospital to determine their fitness for flying duty. It included a comprehensive EKG examination with functional tests, orthostatic tests, pressure chamber tests for endurance of moderate hypoxia and assay of blood cholesterol by the method of Mrskos and Tovarek. The age, mean annual flying hours during the period of flight service, position, class qualification and flight specialty were entered on special cards. The group studied consisted mainly of individuals on the permanent and part-time staff who received the regulation diet and usually performed flight training flights.

Of the subjects, 19% were rated healthy and 12% (with anomalous refraction, etc.) essentially healthy; the early stage of essential hypertension and neurocirculatory dystonia of the hypertensive type was diagnosed in 24%, functional diseases of the central nervous system were diagnosed in 13% and diseases of the gastrointestinal tract were found in 9. Ten pilots presented atherosclerosis, two of whom had sustained myocardial infarction in the period between examinations by the commission; 10% were deemed unfit for flying duty for health reasons and 17% were qualified as fit, but with restrictions; the others were deemed fit for flying with no restrictions.

In the tested pilots, the mean blood cholesterol level constituted 5.08 ± 0.06 mmole/l. Table 1 lists data characterizing the mean blood cholesterol level in pilots referable to different age groups.

Table 1. Mean blood cholesterol content in pilots of different ages

Age, years	Blood cholesterol (Mm), mmole/l	Reliability of difference*
20-25	4.88 ± 0.32	< 0.02
26-30	5.19 ± 0.23	< 0.05
31-35	5.44 ± 0.17	> 0.1
36-40	5.60 ± 0.10	< 0.1
41-45	5.88 ± 0.09	< 0.1
Over 45	5.91 ± 0.16	> 0.1

*Reliability of differences calculated in comparison to mean blood cholesterol level for the entire group.

The listed results confirm a general tendency: with age, the mean blood cholesterol level rises in pilots, reaching a maximum at 45 years or older. In 137 subjects, blood cholesterol was in excess of 5.68 mmole/l, and in 70% of them it equaled or exceeded 6.45 mmole/l. Since hypercholesterolemia of 6.45 mmole/l is evaluated as a risk factor for atherosclerosis, of interest was the incidence of hypercholesterolemia of 6.45 mmole/l in each age group. These data, along with estimates of coefficients of likelihood, are listed in Table 2.

Table 2. Incidence of hypercholesterolemia in pilots of different ages

Age, years	Extensive indices, %		Likelihood coefficient
	pilot group with ≤6.45 mmole/l hyper- choles- terol	pilot group with >6.45 mmole/l choles- terol	
To 25	14	39	14/39 = 0.36
26-30	43	7	43/7 = 6.61
31-35	10	14.3	10/14.3 = 0.70
36-40	24.3	27.4	24.3/27.4 = 0.89
41-45	41.4	33.5	41.4/33.5 = 1.24
Over 45	18.6	13.9	18.6/13.9 = 1.34
Totals	100	100	

The coefficients of likelihood indicate the extent to which hypercholesterolemia of 26.45 mmole/l is likely in pilots of different ages, as compared to the probability of blood cholesterol level below 6.45 mmole/l. For example, a coefficient of 1.34 for pilots over 45 years of age indicates that the risk of hypercholesterolemia at this age is 1.34 times higher than the mean probability.

Such estimates can serve as the basis for individual prognostication of hypercholesterolemia. According to our data, in addition to age, one must also take into consideration the following factors (indices) for this purpose: annual mean flying hours, position, class qualification and flying specialty.

The coefficients of likelihood were calculated for each of these factors, as in Table 2, after which a rating table was prepared. To simplify the calculations, instead of likelihood coefficients P we used the logarithms thereof, rounded and multiplied by 10. This enabled us to subsequently add, rather than multiply, the prognostic coefficients ($PC = 10 \log P$) in making complex evaluations.

Thus, all estimates of hypercholesterolemia risk are in the range of -4.4 to +4.03. The sum of maximum values of prognostic coefficients for the 5 factors is: $PC_{\max} = 1.3 + 3.4 + 0.9 + 0.9 + 4.03 = 10.53$. The sum of minimum values of these indices is: $PC_{\min} = (-4.4) + (-0.8) + (-2.7) + (-1.3) + (-4.0) = -13.2$. Consequently, the entire range from minimal to maximal risk of hypercholesterolemia is from -13.2 to 10.53.

In order to calculate the complex risk of hypercholesterolemia, for example, for a 33-year-old 1st rank, 1st class pilot who flies sports aircraft with a

very high annual mean number of flying hours over the entire period of flight work, we must add the prognostic coefficients found in the rating table. The overall prognostic coefficient (PC_{sum}) will be: $PC_{sum} = 0.9 + 3.4 + 0.9 + 0.04 + 4.03 = 9.27$. The magnitude of this coefficient is indicative of a high probability of hypercholesterolemia in this pilot.

Table 1. Rating table for individual prediction of the risk of hypercholesterolemia of 16.45 mmole/l in pilots according to prognostic coefficients (PC).

Age years	PC	Position category	PC	Class qualification	PC	Flight speciality	PC	Mean annual flying hours	PC
Over 45	+3	3d rank	+4	1st class	+0	Fighter pilots	+2	very high	+0.3
40-45	+0	2d "	+0	2d "	+1	Sports aircraft pilots	+0	high	+0.4
35-40	+2	3rd "	+2	3d "	+1	Transport aircraft & helicopter pilots	+0	above average	+0.4
30-35	+1.5	Administrative staff	+0	none	+1	Navigators	+0	average	+0.6
25-30	+2	1st rank	+0	—	—	Radio operators & others	+1	low	+1.3
20-25	+4	—	—	—	—	—	—	negligible	+4.0

For a 38-year-old pilot, 2d class who flies helicopters, with an average number of annual mean flying time over the period of flight work, this prognostic coefficient will be: $PC_{sum} = (-0.5) + (-0.8) + (-1.37) + (-0.7) + (-0.7) = -4.17$. For him the risk of hypercholesterolemia is much lower.

Pilots can be divided into the following groups, according to their PC: 1) pilots for whom hypercholesterolemia is unlikely (PC range from -13.2 to -0.01); 2) pilots for whom it is probable (PC range from -0.60 to +1.59); 3) pilots in whom hypercholesterolemia is quite probable (PC from +1.6 to +10.50).

In order to assess the accuracy of the proposed prognostic table, a retrospective verification was made, with estimation of PC for each pilot. The risk of hypercholesterolemia was not correctly estimated in only 48 cases (40 pilots with blood cholesterol levels above 5.65 mmole/l), which constitutes only 10% of all those examined.

The group of flight personnel studied is relatively small. Nevertheless, the obtained results are indicative of the possibility of predicting the

risk of hypercholesterolemia, with consideration of occupational factors of flight work, and, consequently, the possibility of a differentiated approach to primary prevention of atherosclerosis in pilots.
[654-10,657]

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BEHAVIORAL SCIENCES

NORMAL, ABNORMAL VERBAL ACTION CONTROL COMPARED IN NEW BOOK

Moscow DEFECTOLOGIYA in Russian No 4, 1979 pp 69-72

[Review by I. Yermenko and V. Sinev of the book "Razvitiye slovesnoy regulatsii deystviy u detey" (Development of Verbal Action Regulation in Children) by V. I. Lubovskiy, Pedagogika, Moscow, 1978]

[Text] Human Speech. Imagine how much research has been devoted to revealing its essence and its significance! And despite this, there are still so many secrets awaiting their explanation in this unique gift which, as Engels said, was together with labor one of the main stimuli of man's development.

Deviant scientists have revealed the essence of many speech functions from Marxist positions. Valuable data have been acquired on the role of speech in man's cognition of reality, in his life orientation, in learning in the broad sense of this term, and so on.

At the same time we have far from completely revealed the laws governing manifestation of the internal regulatory function of speech, especially in its formative stage in the presence of abnormal mental development. In particular, considering the unity of speech and thinking, there is an extremely great amount of interest in revealing the way verbal regulation operates in the underdeveloped intelligence, as in the case with mentally retarded schoolchildren.

Apparently our lack of knowledge of this problem is often one of the causes for understating the verbal resources available for training such children, manifested as futile attempts at substituting for them by purely practical actions.

Life has shown that this can never be done with useful results, since speech is subjectively present and participates in all educational processes and resources, to include practical actions. The whole problem lies here in the suitability of utilizing verbal resources.

The recently published book by V. I. Lubovskiy will provide considerable assistance in solving this problem.

As can be seen from the annotation, the creative intent of this book was to reveal, in the comparative aspect, the unique features behind development and improvement of verbal regulation of actions in normal and abnormal children.

This intent is realized broadly for the first time in the literature: In the general theoretical aspect, the author examines verbal regulation in relation to the physiology and psychology of higher nervous activity; in the general psychophysiological aspect, the author analyzes the unique features governing development of conditioned associations in normal and abnormal children; in the special aspect of the science of handicapped children, the author illuminates problems concerning development of verbal action regulation in mentally retarded children, children experiencing delays in mental development, and persons with analyzer defects, and he reveals the general and specific laws governing abnormal development of the mind from the aspect of verbal regulation.

Having himself on an analysis of his own and published experimental data, Ibravskiy suggests a working scheme for analyzing verbal regulation of behavior, which considers two parameters describing the external form of verbal regulation (motivation for action and verbal reinforcement) and two parameters describing the internal form (generalization accompanied by verbalization of the individual's actions, and planning of forthcoming actions).

We feel that this approach is extremely productive, and that it opens up considerable prospects for revealing the unusually complex mutual relationships existing between the internal and external regulatory processes of the individual, and especially of persons suffering mental deficiency, for whom formation of internal regulation is delayed, and in relation to whom there are deep contradictions between the two forms. By analyzing development of regulatory processes in relation to these parameters taken together, we can obtain an integral picture of not only the unique features behind development of verbal regulation and self-regulation in children but also of the influence these processes have on formation of other aspects of the mind, which would in turn provide great possibilities for determining the concrete points of application of pedagogical guidance to development of the mentally retarded child, and for suitable organization of corrective treatment.

Following the best traditions of A. R. Luriya's psychological school, in his second chapter "Unique Features in Formation of Conditioned Associations in Man" the author presents the grounds offered by natural history for the laws governing formation of regulatory processes in normal children, and their deviations in the presence of pathology, making correct use of the motor conditioned reflex method. It should be noted immediately here that this method, which has become classical, is successfully updated, and its truly scrupulous use by the author helps him to penetrate deeply into the narrow of the scientific objectives posed in his experiment.

Since the implementation of the experimental program permitted the author to clarify a broad range of questions: to reveal that which is general and that which is unique in formation and verbalization of the simplest positive conditional associations, and differences exhibited in this regard in normal and mentally retarded young schoolchildren; to detect the dependence of the quality with which associations of greater complexity are developed and verbalized on the degree of abstraction of the stimulus and on the conditions under which the associations are formed; to reveal the role of verbalization and generalization, as reflected in the speech and experience of the child, in the process of formation of conditioned associations; to determine the unique features in the transition from reaction directly to the immediate stimulus to reaction to the verbal symbol representing it, which has especially great significance to clarifying the nature of interaction among the signaling systems in normal conditions and in pathology.

Thus the method used by the author which, as is correctly emphasized in the book, is a certain model of the natural course of man's acquisition of experience, made it possible for him to delve deeply into the essence of this process. We note that data obtained in this series of experiments have obvious practical interest, in addition to theoretical significance. In particular, the persuasive demonstration of the influence verbalization and generalization of experience has on the mobility and strength of new (secondary) associations formed, and the distillation of difficulties and shortcomings in function of the verbal system typical of mentally retarded children grant the educator to seek sensible ways to combine words and practical techniques in the training process. The book presents valuable information on the possible negative influence former experience may have on formation of new conditioned reflex associations in the mentally retarded child and on their adequate verbalization and transfer, and it deeply reveals the psychophysiological mechanism behind the influence of the former experience. Without considering these data, we cannot fully satisfy the requirements of didactic principles such as consciousness in training and soundness of assimilation of knowledge, skills, and habits by students.

The author considers the possibility of utilizing some ways to surmount the negative influence of former experience on formation of new associations in the child only in passing. However, even this material is enough to support practical corrective training, though it would have been better for the author's examination of this aspect of the research to be supported by investigations of greater detail and generality.

The manuscript's third chapter is a logical continuation of the author's analysis of problems concerning the child's acquisition of experience and verbalization in the verbal signaling system. Chapter 4 is devoted to the study of verbal formation of actions in mentally retarded children.

Many have been studying the unique ways in which children form associations to experience. Verbal instruction gives them without, the author traces the verbal formation of different functions of words pointed out

earlier) in mentally retarded children, beginning with preschool age and ending with senior school age: He analyzes the way the simplest and most complex verbal instructions are comprehended, their reproduction by children, practical actions in response to instructions, verbal reports on actions completed, and the planning of forthcoming activity.

Problems considered in this part of the research are clearly interesting in that we know that different forms of teaching mentally retarded school-children to perform mental and practical activity and to subsequently control it are the most important components in the teaching of intellectually deficient children, who possess significantly reduced capabilities for independent organization of their actions.

The author persuasively demonstrates that when the child is capable of generalizing an association between a conditioned signal and his response to it, and when he can understand at least the elementary causal dependence between his action and a reinforcement corresponding to it, his activity begins to proceed on the basis of internal self-regulation. Special emphasis is laid on the role of adequate and conscious verbal mediation in the development of precisely this level of action in children. The reader will be interested to a certain extent in data demonstrating that even a comprehensible instruction does not always lead to correct action on the part of a mentally retarded child, since in view of the impulsiveness inherent in such children (especially excitable ones) the action may not be performed correctly.

The author also examines the highest form of internal verbal regulation of action in children, manifested as the possibility for imagining the succession of the forthcoming actions and, consequently, planning activity. He points out that "development of this form of regulation does not end in mentally retarded children until senior school age, and it presupposes both sufficient development of their practical experience and development of their verbal reflection" (p. 137). We feel it important to emphasize in this connection that experiments furnishing the material upon which V. I. Lubevskiy relies involved mentally retarded children who were possibly not subjected to extensive training oriented specially at developing their different intellectual components of practical activity. The data of some pedagogical studies performed recently in the field of oligophrenic pedagogics demonstrate that given the appropriate learning conditions, the students in schools for the handicapped can begin to understand the elementary cause-and-effect relationships of their practical activity (work in particular) and acquire the ability to plan this activity in their early years.

The author presents very interesting and valuable material on the psychological features accompanying development of conditioned associations in mentally retarded preschool children. It would seem that demonstration of the advantages (from the standpoint of achieving correct performance of actions by the child) of a method of instruction based on visual demonstration of an action, used in relation to subjects having an underdeveloped capability for

orienting upon purely verbal instructions, would have important practical significance to special preschool pedagogy.

Data acquired by the author on development of mentally retarded preschool children have significance to devising methods of early diagnosis of deviations in mental development, which is extremely important to insuring prompt exercise of corrective actions upon the development of abnormal preschool children.

we know how difficult it is to precisely differentiate mental retardation from delayed mental development in children, though the fundamental importance of correctly resolving this issue to determining the appropriate type of training institution to which the child should be sent for further training is entirely obvious. In the fourth chapter of the monograph, "Features of Verbal Regulation Accompanying Other Forms of Abnormal Development," V. I. Labovsky specially discusses the qualitative uniqueness of the development of conditioned associations and of their verbalization accompanying verbal regulation of actions by children suffering delayed mental development, in comparison with oligophrenic and normal children. In particular, he demonstrates that in contrast to mentally deficient children, children suffering delayed development exhibit a closer interaction between both signaling systems when forming conditioned associations, and in this process verbal generalization begins to play the dominant role. This makes this group of children more normal. At the same time analysis of the operation of associations, of their dynamic alterations in children suffering delayed development attests to presence of certain deviations from normal, associated with reduced efficiency of the central nervous system and with greater inertia of nervous processes, typical of such children.

This chapter also analyzes information on verbal regulation in children with sensory defects. These materials permit the author to arrive at important theoretical generalizations having a bearing upon handicaps in general. The author also devotes significant attention to revealing the general laws governing mental development, the difference between normal and abnormal children, the uniqueness of the laws governing development of cognitive activity in relation to all categories of abnormal children, and the specific features manifested in the presence of different sensory defects and disturbances of higher nervous activity (in the chapter "General and Specific Laws Governing Abnormal Development of the Mind").

Utilizing the term "verbal mediation," which is the most adequate to all manifestations of the second signaling system in mental activity, the author logically persuades us that disturbance of verbal regulation of activity is one of the general laws in development of the minds of abnormal children. Change in the capability for receiving and processing information is no less typical of all categories of abnormal children (though it expresses itself to different degrees and with different qualitative modes, and it is elicited by different causes): reduction, in

comparisons with normal, of the volume of information received per unit time; growth in the "noise" level, which may distort the accuracy of the information; retarded decoding and recoding of information.

Lubovskiy suggests the interesting opinion that even in application to the most severe cases of disturbed development (in the presence of mental retardation), there exist features (or laws) of mental activity that are not only negative but also positive, as manifestations of the body's compensatory forces. As an example of such a positive law behind alteration of the mind in the presence of organic afflictions of the central nervous system, the author cites the capability mentally retarded individuals have for developing new conditioned associations without full participation of their underdeveloped verbal system.

The author does not limit his presentation to theory in regard to the general and specific laws of development of abnormal children; he also examines the possibilities of practical use of these premises. Discussing the complexity of developing a truly scientific basis for arriving at a differential diagnosis of mental development, Lubovskiy naturally envisions a promise in creating valid method for solving this problem taking account of these laws. In this case he presents as an example an interesting diagnostic technique designed so that it permits us to reveal specific features in spontaneous mastery of speech and conscious utilization of grammatic entities in the presence of various forms of mental deficiency.

Thus making an important step toward revealing a hierarchical system of laws which, as the book correctly points out, can be found at the basis of all concrete areas of science, the author not only helps to deepen the theory of the science of children's handicaps but also makes a significant contribution to solving its practical problems.

Despite the fact that the book contains a great deal of diverse scientific experimental and theoretical material that is sometimes difficult to "digest instantaneously," it makes very interesting reading. Its attractive features include the significance of the problem, the logic and adherence to principles demonstrated by the author in his search for scientific truth as he penetrates into diverse, sometimes contradictory facts, and his examination of different variants of possible interpretations of particular data obtained in his own research and in the experiments of other authors. In his analysis, Lubovskiy is both critical and self-critical, which helps him to persuasively support the conclusions he makes.

In this case the author never makes categorical statements whenever substantial scientific grounds for a final conclusion concerning some problem are absent. Such problems are posed in the book as ones requiring further special study; the ability to envision the importance of such study to science and practice and to outline the possible productive directions of research are a credit to the author's scientific insight.

V. I. Lazavskiy's monograph is not only a valuable contribution to modern science of children's handicaps; it also opens up perspectives for further research on human mental development.
[665-11004]

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ABSTRACTS OF THE REPORTS HELD AT THE COMMISSION ON BIOLOGICAL DETERIORATION OF MATERIALS (ALL-UNION BOTANICAL SOCIETY)

Leningrad MIKOLOGIYA I FITOPATOLOGIYA in Russian No 3 1979 pp 266-268

[Text] L.A. Kossior, Yu.P. Nyuksha, Cellulose Activity of Fungi on Paper in the Presence of Extra Polymeric Compounds.

Paper is a material which combines in articles with many polymeric compounds. For the old production of seals and manuscripts it was characteristic to use a natural protein-starch composition, while in new books synthetic polymers are encountered. In determining the biostability of the product it is important to judge regarding the influence of these additional compounds on the process of the biological destruction of the paper's cellulose basis.

We investigated the influence of the protein-starch adhesive composition (ps), of strengthening solutions based on gelatin (sg) and polyethyleneimine (PEI) and also the influence of the antifungal preparation polyhexamethylene-guanidine (PHx) on the cellulose destroying capacity of *Chaetomium globosum* Kuntze ex. Fr., *Myxotrichum deflexum* Berk., *Aspergillus terreus* Thom., *Myrothecium verrucaria* (Alb. et Schw.) Ditm. ex Fr., *Sporotrichum bombycinum* (Cda.) Rab., *Stachybotrys chartarum* (Ehr. ex Lk.) Hughes, *Trichoderma viride* Pers. ex Fr., *Verticillium tenerum* Nees ex Lk. As a means of evaluation we used as indices the decrease of mass and the changes of viscosity of a 1% solution of the sodium salt of carboxymethylcellulose. The complete inhibition of the development of fungi in the presence of 1% PHx was established. Another synthetic polymer displayed a negative influence on the production of cellulose in the majority of fungi. A more sensitive test in this case was the decrease in mass. A decrease of cellulose activity under the influence of PEI was observed with *Trichoderma viride*, *Myxotrichum deflexum*, *Sporotrichum bombycinum*, *Chaetomium globosum*.

The natural composition of ps and sg on the whole stimulated the formation of cellulose, the latter being more active. Essential differences in the results were observed as judged by the two methods. The greatest strengthening of cellulose destroying ability occurred with *Trichoderma viride*, *Myxotrichum deflexum*, *Myrothecium verrucaria*, *Verticillium tenerum*. Fungi of each species displayed many other individual peculiarities.

(February 2, 1978)

M.A. Yurova. The Participation of Microorganisms in the Corrosion of Metal in Fresh Water.

An important factor in the pitting corrosion of steel used in fresh water is the vital activity of microorganisms. On the surfaces of metal structures are created physico-chemical conditions favorable for the development of microorganisms of various physiological groups. Investigations were carried out for studying the conditions of the continuing process of corrosion of underwater metal surfaces of hydrotechnical structures at four hydroelectric stations situated on the Kol'skiy peninsula and in the Leningrad oblast. The hydrochemical composition and the temperature conditions of reservoirs at hydroelectric stations were studied, the rapidity of the corrosion of steel was measured, a chemical analysis of the products of corrosion was carried out, and the qualitative composition of the iron-manganese-containing bacteria developing on underwater metal surfaces was revealed and investigated. Laboratory tests allowed us to display the ability of various forms of iron-reducing bacteria to increase the dissolution of steel. A hydrochemical analysis of the reservoirs was executed according to generally accepted methods. The speed of corrosion was established by a weight method, the chemical composition of the corrosion deposits was defined by roentgenographic and derivative analysis. To study the qualitative composition of the iron-manganese-containing microorganisms the method of capillary microscopy was employed, and to detect bacteria in the products of corrosion a sowing on Brownfield's medium was employed. For laboratory tests samples of steel of grade 1 were used. Twenty-three strains of bacteria isolated from bottom sediment of water-bearing lakes of the Karel'skiy isthmus served as seeding material.

The corrosion of underwater metal constructions and products of corrosion in the form of lamellar concretions was established, under which over a year develops pitting of a depth of 0.2-0.5 mm. Physico-chemical conditions for this are characterized by a slight mineralization of the water, by low summer temperatures, and by significant concentrations of oxygen. The corrosive damage of underwater metal structures is accompanied by development on the metal surfaces of microorganisms of the iron-manganese-containing group. For each reservoir is characteristic its own definite composition of microorganisms. On all the constructions were detected iron-reducing bacteria. With laboratory tests the ability of several of these bacteria to increase to a significant degree the dissolution of carbon steel in an electrolyte was revealed.

(April 15, 1978)

N.S. Gal'perina. Results of the Investigation of the Mycological and Technical Status of the Wood Supporting Structures of the Iconostasis of the Peter and Paul Cathedral.

In 1977 the coworkers of the laboratory for the testing of structures of the Leningrad Engineering and Construction Institute (LISI) carried out the work of the technical and mycological investigation of the wooden supporting structures of the iconostasis and also of the vestibule, the lectern, and the pulpit of the church itself and the bas-reliefs at the Peter and Paul gates. Such an investigation was being carried out for the first time. Its goal was to reveal weak and affected places before the restoration work. Special attention was devoted to the structures of the supporting framework. For the first time since the time of the construction the question arose about the reliability of the framework. From an engineering point of view the iconostasis was a flat mechanical system 20.18 m tall in the central part, 24.4 m wide, and 1.2 m deep. The stability of the position of the elements was guaranteed by metal tie-beams making fast at six levels of the iconostasis to brick pylons and the walls of the cathedral. The iconostasis bears a load only from its own weight and from the icons found in it.

As a result of the investigation, diagrams and blueprints of the supporting structures and blueprints of the most crucial junctions were drawn up. In the structure of the iconostasis appreciable relative displacement of details and elements was not detected. There are not any derangements of the building; only in the structure of the frame of the crucible significant shrunken cracks were detected. LISI considers expedient their periodical inspection of the building with measuring surveys defining possible displacements of the structures and elements in space.

The mycological investigation of the iconostasis was carried out on the whole in the sanctuary part of the cathedral in order not to harm the gilt and not to disrupt the work routine of the museum. The sanctuary side of the iconostasis was covered with canvas painted over with oil paint. Mycological investigation was carried out on all layers and all supporting wooden structures of the iconostasis. For this its canvas facing was opened, samples of wood were taken which were grown on an agar medium or were passed through a moist chamber with subsequent isolation of pure cultures. In all more than 125 samples were taken.

We succeeded in revealing small nidi of the wood-destroying fungus *Coriolus versicolor*. The largest nidi were located at the place of the contiguity of the iconostasis with the granite plinth between axis 2-3 and 4-5. The wood in these places was dried, brownish, with small cracks; in places it was soft. A small place of deterioration was located in the planking of the framework over the first layer between axis 2 and 3. Everywhere the nidi were old, dating probably to the 30's of last century. The fungus is weakly active. In a number

of *Trametes*-microfungi and house fungi were detected along with the genus *Alternaria*, *Penicillium*, *Graphium*. They often are pathogens, creating favorable conditions for the colonization of the wood with house fungi.

The fungi of biological deterioration are not active, but require constant observation. It is recommended that protective measures be carried out simultaneously with the replacement of the canvas existing now with a fireproof one. An experiment jointly with the workers of the Institute VNIIOGA (GAO) (All-Union Scientific Research Designing and Planning Institute) or best a new fireproof covering based on epoxy resin will be tested. Planks of raft and the entire wood at the place of the contact with the granite plinth will be treated with a wood preservative based on isopol developed by us together with the Kuzbyshevskiy construction institute.

(May 13, 1978)

V.P. Burevskiy. The Use of Ultrasonic Vibrations to Determine Hidden Biological Deterioration of Wooden Constructions.

The possibility of the use of ultrasonic vibrations for the control and evaluation of the technical condition of wood directly on full-scale sites was examined. Data were cited, obtained as a result of the investigation of samples of wood having various levels of biological deterioration. The correlational dependence between the velocity of spread and the magnitude of damping of the ultrasonic vibrations (USV) and the level, dimensions and location of biodegradation of wood were established. Necessary recommendations were given for using USV for investigating individual wooden structures.

(December 14, 1978)

L.A. Arslanova, N.P. Verzhinskaya, L.K. Zubkov. A Method of Heightened Sensitivity for Defining the Influence of Chemical Fibers on the Vital Activity of Fungi and Bacteria.

At the present time the sphere of application of chemical fibers, including those with special properties, continues to widen. Various conditions of exploitation elicit the necessity of evaluating their biological stability. One of the ways of exact methods of defining the biological activity of materials, especially newly created materials, grows.

With the help of the gas chromatographic method, the possibility of using several biochemical processes as methods of detecting the influence of chemical fibers on microorganisms detecting the influence of chemical fibers on microorganisms was shown. The following fibers served as objects of investigation: poly(vinyl alcohol)-vinyl, polyamide-Capron (polycaprolactan) and modifications on its basis: formalin possessing antimicrobial properties, and sodium a fiber of structural modification. The activity of respiration was defined in microscopic cellulose-destroying fungi, in saprophytes, denitrifiers,

nitrogen fixation. Acetylene-reducing activity was defined as a group of microaerophilic microorganisms. The quantity of carbon dioxide gas and ethylene formed in the course of the experiment was measured from standard peaks at a calibration curve. The analysis was carried out on a gas chromatograph "Gazur 102."

The results of the investigation showed that the intensiveness of respiration in all the microorganisms in the presence of vinyl, capron, and stearic is practically indistinguishable from the control, whereas in the presence of lactic respiration decreases appreciably, the more so, the higher the content of the antiseptical preparation (nitrofurazone). Upon investigating the acetylene-reducing activity of nitrogen-fixing microorganisms in the presence of the analyzed fibers it was established that along with an inhibition of respiration in the presence of lactic a decrease in nitrogen gas activity occurs, while upon contact with other fibers a deviation from the control is not observed.

The results of the investigation of the biological activity of chemical fibers by the gas chromatographic method correlates well with the data obtained with the use of the agar plate method widely used for this purpose. A conclusion was drawn about the expediency of using gas chromatographic detection of carbon dioxide gas to reveal the activity of microbial respiration in the presence of chemical fibers. The highly sensitive acetylene method was proposed as the fast method for defining the level of inhibition of biological processes.

(February 14, 1979)

Report No. "Antibacterial Action of Nitrofurazone," "Mikrobiologiya i Epidemiologiya," 1979

1979

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SPREAD OF THE GREEN-WINGED BIRD BUTTERFLY (*CHORONA PALLASTARIA* L.)
 (LEPIDOPTERA, NYMPHALIDAE) IN THE EASTERN TRANSBAIKALIA

BY V. V. KISHINEVSKIY (Ulan-Ude, Buryatia, RSFSR) 1979 pp. 53-54

(Article in: Yu. I. Zhuravskiy)

(Text) The green-winged bird butterfly (*Chorona pallastaria* L.) is widespread in the Palearctic [2-4], but data on its mass reproduction have not been published.

In 1976 I managed to discover an area of mass reproduction of this species in a group of trees of species V. Kuznetsovskiy Forest, Zhetysayl' Forestry Khatynskan, Tolyatinskaya District. The green-winged bird butterfly dominated the summer-fall group of phytophages here, and its abundance attained 1,500-2,000 individuals per tree. In other areas in the eastern Transbaikalia in which this group of phytophages was present, the green-winged bird butterfly's abundance was extremely small (Table 1).

The period of flight of the butterfly extends over a rather long time: the first (1-4) individuals fly as early as at the end of May, while the last butterflies were caught at the beginning of August (see Figure). Flight becomes intensive at the end of June. Females lay their eggs on the upper side of leaves at a similar time. Freshly laid eggs are yellow, but as the embryo develops they turn bright red.

Butterflies feed on the European white Birch (*Betula verrucosa* Ehrh.) they were not observed to feed on other woody and shrubby species. Recently hatched caterpillars begin to feed on the upper side of leaves, while they disengage them from the caterpillars of other phytophages infesting birch groves; the latter preferring to feed on the lower side of the leaf blade. Caterpillars of the green-winged bird butterfly draw the edges of part of the leaf upwards with several silk threads and then, resting within the resulting fold, devour the leaf. At the beginning of the third instar they begin to attack the leaf blade from the edge, but the nature of feeding remains unchanged, though as they grow the caterpillars begin to utilize the petiole just as a shelter. In this case they secure several silk threads to the upper edge of the leaf and, drawing the edges together, they bend them apart. As a result the caterpillar forms a shelter in which

Table 1. Relative Abundance of Species (Percent of Total Number of Cocoon) in the Group of Phyltophaga in Some Areas of Mass Republication in Fall 1970

No. (1)	(2) <i>Phyltophaga</i>			Species (3)
	(4) <i>Phyltophaga</i> - 1.00	(5) <i>Phyltophaga</i> - 1.00	(6) <i>Phyltophaga</i> - 1.00	
<i>Agrotis trifolii</i> L.	27	0	0	
<i>Agrotis trifolii</i> L.	13	0	16	
<i>Agrotis trifolii</i> L.	7	4	2	
<i>Agrotis trifolii</i> L.	0	0	9	
<i>Agrotis trifolii</i> L.	3	0	4	
<i>Agrotis trifolii</i> L.	10	0	16	
<i>Agrotis trifolii</i> L.	17	0	14	
<i>Agrotis trifolii</i> L.	7	40	2	
<i>Agrotis trifolii</i> L.	1	0	4	
<i>Agrotis trifolii</i> L.	0	10	1	
<i>Agrotis trifolii</i> L.	0	0	1	
<i>Agrotis trifolii</i> L.	3	3	2	
<i>Agrotis trifolii</i> L.	3	0	0	
(4) <i>Agrotis trifolii</i> L.	7	20	19	
(7) <i>Agrotis trifolii</i> L.	18	24	92	

Key:

1. *Agrotis*
2. *Phyltophaga*
3. *Phyltophaga*, Section 75
4. *Phyltophaga*
5. *Phyltophaga*, Section 14
6. *Phyltophaga*, Section 34
7. Number of cocoons per square meter of litter



Phyltophaga of the Crescent-Winged Butterfly in the Southern Hemisphere: (1) Cocoon; (2) Butterfly; (3) Egg; (4) Larva.

Key:

1. Egg
2. Larva
3. Pupa
4. Adult
5. Imago
6. Winter inactivity

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ПРИЕМНО-РАСПРЕДЕЛИТЕЛЬНЫЙ ОТДЕЛ "НАУКА ДАКА" "Vestnik zoologii", 1979

ANGINA INCIDENCE IN 1977-1978 FLU EPIDEMIC REVIEWED

View SERIAL NUMBER, SUBVIRUS I DOVLOVICH MOLEZNEY in Russian No 3, 1979 pp 12-13

[Article by Candidates of Medical Sciences V. I. Oeyker and Yu. A. Romanov from the Clinical Department (Prof D. M. Zlydnikov, leader) of the All-Union Scientific Research Institute for Flu under the USSR Ministry of Public Health and Polyclinic No 34 of Kalininskiy Rayon of Leningrad; "On the Question of Angina Incidence During the 1977-1978 Flu Epidemic"]

[Text] In one of the microregions of Leningrad the authors studied the incidence of angina during the period of the epidemic of Influenza A (H₁N₁) in 1977-1978, the virus of which was identical to the A virus which caused the flu epidemic in 1946-1956.

Serological research was carried out on 470 patients with the clinical diagnosis of "flu." The virus of the group A₁ was detected in 67.9 percent of the patients, group B in 9.7 percent, parainfluenza in 1.7 percent, adenoviruses in 3.6 percent, respiratory syncytial viruses in 4.4 percent, cytoplasmic infection in 1.6 percent; a mixed viral infection was established in 2.4 percent of those examined.

During the period of the flu epidemic, 883 cases of angina were recorded at the polyclinic, and this was 1.29 percent of the entire population in the polyclinic's microregion. This indicator did not exceed the morbidity indicators for the population of the given microregion in the city either before or after the outbreak of the flu epidemic.

In terms of clinical forms, the illness was differentiated in the following manner: angina follicularis was detected in 68.3 percent of the patients, lacunar angina in 21.6 percent, fibrinous-membranous in 7.8 percent and fibrinous-necrotic in 4.7 percent. In 3.6 percent of the patients the illness was the result of an aggravation of chronic tonsillitis.

In 91.7 percent the angina follicularis and lacunar angina arose as an independent illness, in 6.7 percent the lacunar angina did, but in 84.9 percent

of the cases the fibrinous-membranous and fibrinous-necrotic forms of the angina were observed against a background of acute respiratory viral infections.

In the angina patients bacteriological research was not conducted for microflora on the masses from the pharynx.

The average duration of disability was 6.7 days with the flu, 6.5 days with the acute respiratory infection, 10.5 with angina follicularis, 9.5 with lacunar angina, 7.5 with fibrinous-membranous, 11.5 with fibrinous-necrotic, and 9.9 days with aggravation of chronic tonsillitis.

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A CRITICISM OF SOME BURGEUOIS PHILOSOPHICAL CONCEPTIONS IN MEDICINE

RUSSIAN MEDICINE-MEDITSINSKAYA EKSPERTIZA in Russian No 3, 1978 pp 3-7

(Article by T. V. Marazov and E. P. Shirmakly)

THE 19th century socialism has created broad possibilities for reaching our Party's program goal of developing communist awareness in the people. The 23rd CPSU Congress has worked out a clear policy line, strategy, and tactics for our further movement toward communism, and it has clearly defined the basic directions to be taken by ideological work in the present stage. Important in this regard is the recently adopted decree of the CPSU Central Committee "On Further Improvement of Ideological Work and Political Indocctrination." The revolutionary theory and policy of the CPSU must become the persuasion of every Soviet citizen, an active life position that can stand up to any manifestations of alien ideology. "There can be no room for compromise and neutrality in the struggle between the two philosophies. What we need here is high political awareness, active, effective, and intensive propaganda, and a prompt repulse to hostile ideological sabotage."*

The ideological struggle embraces not only the social sciences; it is penetrating ever deeper into concrete areas of specific scientific disciplines. V. I. Lenin's premise that science cannot remain neutral, that even here one may take either a materialistic or an idealistic line, pertains fully to medicine, which has become a broad field of collisions between different philosophical theories.

One unique trait of modern bourgeois philosophy is the crisis of its fundamental theory. Examination of its initial philosophical positions is a typical symptom of this crisis. This pertains especially to the gnostic constructs of modern positivism, as well as the conceptions of Freudism and psychoanalytic medicine.

Some bourgeois ideologists, gaining support from modern reactionary idealistic trends in medicine such as Freudism together with its various

*"Materializm i mya" (Ideas and Matter) (Proceedings of the 23rd CPSU Congress), Moscow, 1966.

offshoots, existentialism, psychosomatics, linguistic idealism, and others, are vainly trying to refute the significance of Marxist-Leninist methodology in progressive development of science. Representatives of these reactionary schools and trends utilize pseudoscientific terminology, citing the data of biology and natural history, and they not only claim that the theoretical foundations of their conceptions have universal significance to all modern medicine, but they also try to extend them to social phenomena.

Considering the above, the present situation demands that we intensify our struggle against bourgeois ideology in areas concerning the theoretical, methodological, and social problems of the biomedical sciences.

The ideological struggle is acquiring its most acute forms in areas of medicine such as psychiatry, forensic medicine, social hygiene, and medical psychology, in which the social orientation taken to public health and research on human diseases has especially important significance.

Among the important methodological problems in psychiatry, forensic medicine, and other sciences, we should first single out those such as the relationship between that which is social and that which is biological, the problem of quality, the relationship between causes, conditions, and motives, the interaction of structure and function, and so on. It would be difficult to overstate the methodological and philosophical significance of the personality-environment problem, and mainly the behavior determination problem, to these sciences.

V. I. Lenin emphasized that the idea of determinism "negates neither the reason nor the conscience of the individual, nor evaluation of his actions."¹ This statement suggests an important methodological premise concerning the relationship between the internal and the external, between environmental and personal factors in determination of behavior. Human behavior is the result of an interaction between environmental and personal factors, with the personality's social and moral orientation playing the decisive role. The personality is not the sum of mechanical reflex reactions to environmental influences. The environment gives birth to a particular variant of behavior only through the prism of the individual's philosophical, moral, and ethical ideas, his habits, his individual features, the properties of his mind, his type of higher nervous activity, and so on.

There are no such things as "inborn programs" of social or antisocial human behavior, as the Lombrosians would have us believe. Inborn, rigidly uniform programs of behavior are inherent only to low forms of life, the behavior of which depends on instinct. As we know, Lombrosianism has been subjected to criticism many times, but the scientific groundlessness of

¹Lenin, V. I., "Pis'mo, sobr. soch." (Complete Collected Works), Vol. 1, p. 159

1. Selye's theory on stress and the general adaptation syndrome has recently acquired extensive popularity in medicine and sociology in many capitalist countries. Some bourgeois scholars are trying to extend it to social phenomena, depicting "stressful" relationships between people--equism and the struggle for survival between the weak and the strong--as the principal motives for society's development. Making an analogy with the competitive struggle for existence between cells, Selye considers a process of class formation in which the strongest emerge the victors. Of interest here is the ideological groundlessness of his methodological positions, which are typified by, in addition to the bare materialism of a natural historian, clear idealism in the interpretation of general biological and social problems. While Selye's experimental data do have certain significance to biomedical science, extension of the provisions of his theory to social phenomena would contradict the Marxist-Leninist explanation of society's development.

The ideological disorder presently seen in bourgeois philosophy and the conflicting nature of its directions have found their reflection in philosophical conceptions attempting to interpret the laws of mental development and, in particular, the substrate of mental illnesses. While representatives of some directions believe environmental conditions and interpersonal relationships to be the sole causes of mental disorders and in fact negate a basic basis for mental activity, the other extreme position is guilty of excessive "biologization" of the human mind, of viewing biological and genetic determination of mental functions, their independence from external influences.

Modern neo-Freudianism shifts the center of gravity of the analysis from the integrative processes in environmental influences and interpersonal relationships. However, this direction rests on a purely idealistic foundation: Thus ignoring the essential premise that an external situation or disturbances in human mental relationships play a pathogenic role in the origin of neuroses, Sigmund R. Freud believes that the cause of neurosis lies in a state of "psychogenic fear," which is viewed not as a simple reaction but as the essence of human life, the constant experience of the threat of death.

Existentialism, as a general philosophical trend in the West today, is distinguished by a general trend of idealistic philosophy. Existentialism declares the irrational rather than the rational mind to be the ruler.

Following Hegel and following the ideas of philosophical irrationalism and others, some neo-existence philosophers believe that it is basically irrational to understand mental illnesses, especially a psychosis such as schizophrenia. The premise that the human mind and human mental activity cannot be studied from the point of view of their physiological mechanisms is the methodological foundation of the subjective method of understanding psychosis. As a result, the mind is separated apart from the material, physiological substrate--the human brain.

propagandizing the thesis of a supposed growing threat of conflict between that which is biological and that which is social in man, on the basis of which they make a number of conclusions that are quite false and dangerous in the delivery of verdicts. They include, first of all, the notion of man's "suppeditational-institutional" aggressive nature. Intraspecific aggression of animals in the opinion of A. Lorenz, is precisely the same sort of spontaneous instinctive drive that can be seen in other higher vertebrates.

Assessment of human nature is out of correspondence with the level of development attained by civilization and the social structure, in the opinion of representatives of this direction social life must inevitably be a subject of various sorts of conflicts. It is in this that some foreign researchers see the roots of criminality. Such viewpoints, based on biologization of individual behavior, are in fundamental conflict with the methodological principles of forensic psychiatry and forensic medicine.

The point of view which bases itself on biological predetermination of antisocial behavior erases the line between mental illness and nonpathological manifestations, as well as the line between punishment and compulsory treatment. As V. N. Kudryavtsev* validly points out, biological factors--pathological abnormalities of the mind are included among them--may be viewed as nothing more than a condition of criminal behavior. If these biological factors begin to acquire the role of causes of unlawful actions, which is atypical of them, then the issue must be shifted from the social-legal to the medical field. In such cases the discussion centers not on crime but on socially dangerous actions of a person who is mentally ill. A clear distinction is made between these concepts in the present laws of the USSR.

Those who with Marxism and defending the thesis that human consciousness and behavior depend mainly on hereditary, genetic factors and not on the social environment, the West German theoretician R. Kowler writes that social conditions may have an influence on the individual, promoting his development or inhibiting it. However, in his opinion, the endogenous factor always remains paramount.

The question as to the relationship between that which is social and that which is biological is of course not new in all of the diverse areas of medicine, as can be seen rather persuasively from the long and unending struggle Marxism-Leninism has been waging against all sorts of anti-scientific distortions and vulgarizations in this area of scientific knowledge. Also indicative is the fact that the roots of most modern "biological" and petasociological viewpoints on this subject extend into the past, when in any of nations they coincide with the ideas of vulgar materialism, vulgar Darwinism, Lamarckism, Freudianism, Lombrosianism, and eugenics.

* "Voprosy psichologii," Sbornik (198041), No. 10, 1971.

[illegible]

the fact that the *in vitro* and *in vivo* results are in good agreement. It seems, however, that the *in vitro* results are not representative of the *in vivo* results. In the *in vitro* experiments, the cells were grown in a medium that was very rich in nutrients, and the cells were grown in a medium that was very rich in nutrients. In the *in vivo* experiments, the cells were grown in a medium that was very rich in nutrients, and the cells were grown in a medium that was very rich in nutrients.

the scientific view of reality and effectively utilizing them for the good of mankind. Successes of science based on the Leninist dialectical-materialist methodology of cognition are the clearest evidence of the failure of the hopes of reactionary philosophers for undermining the faith of scientists in materialism, since the essential trait of materialism is precisely that it originates from objective science, from recognition of objective reality reflected by phenomena...."

From the achievements and desired development of science as a result of the Leninist methodology we often find that discoveries that have not yet been explained are already in rather broad use. Marxist literature constantly discusses the problems of development in medicine and emphasizes the need for improving theoretical research and utilizing the latest achievements of the fundamental sciences. In this connection we should draw special attention to "specialized" problems, ones which reveal themselves clearly of all at the junction of various different sciences.

Among today's most important areas of international cooperation

medicine is of course pointed out that development of international cooperation in medicine is an important part of the general struggle for peace, for a sound peace, and for liberty and democracy.

One of the reasons of and the mutual benefit to be found from joint research in medicine among different countries, and the suitability of uniting their efforts to solve the most important scientific problems cannot be denied. Medicine has a great positive influence on relationships between nations and on the development of trust and mutual understanding between nations. As such an international activity itself becomes increasingly more significant as an instrument of peace and creation.

Marxist-Leninist methodology not only promotes but also the internationalization of science. Article 24 requires in particular that the Soviet Union, along with the organized scientific-cultural and technical cooperation of large countries.

It is known that international social contact of nature originates from the development of the world economy and science requires that the problems of science be solved and its orientation toward the goal of solving problems jointly, proceed in their highest degree.

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ALIGNMENT OF INFERENCES TO EXAMINATION OF THE REMAINS OF CREWS FOLLOWING AIR DISASTERS

Zhurnal SSSRNO-MEDITSINSKAYA EKSPERTIZA in Russian No. 3, 1979 (p. 21-24)

(Article by L. K. Alpatov)

With growth in flying speed observed in conjunction with the development of aviation has led to a significant increase in the degree of damage caused by air disasters; this pertains directly to aircraft crews as well. The attention examination commissions give to the remains of crewmembers in their investigation of such cases has grown significantly, since numerous studies performed here in the USSR and abroad have demonstrated the great amount of information such remains provide (L. S. Kalishcheva and M. V. Lavrenko, 1973; V. V. Yord'ko and B. M. Fikovsky, 1974; V. V. Tomilin, 1977; Ishchenko, 1977, 1964; Rasmussen, 1962; Stevens, 1970; Townsend, 1971; Krut'ko, 1973; Collingsly and Noble, 1975; Underwood-Ground, 1977, etc.)

As we know, a completely independent and universally recognized direction in expert medical examination, "aviation pathology," has formed in this connection. Persuasive evidence of such recognition can be found in inclusion of information from such studies in many guidelines of the ICAO (an international aviation organization uniting more than 140 countries, to include the Soviet Union)--"Air Accident Investigation Manual" (1970), "Aviation Medicine Handbook" (1974), and others. One of our 1973 all-union state standards, "Flying Accidents," also contains a section dealing with medical expert examination of air disaster victims.

Medical expert examination of a deceased crew predominantly entails analysis of multiple sources and evaluation of their severity and the mechanism of their formation. The destruction caused by disasters involving modern airplanes may be so great that we often encounter not just bones and extensive injuries but also complete fragmentation of the crew, its clothing, and its gear into numerous parts. This is naturally accompanied by complete loss of the individual's internal organs and biological fluids. All remains become significantly contaminated, and those of biological origin are in some state of decomposition, inasmuch as a certain amount of time is needed to find the place where the aircraft came down, to organize

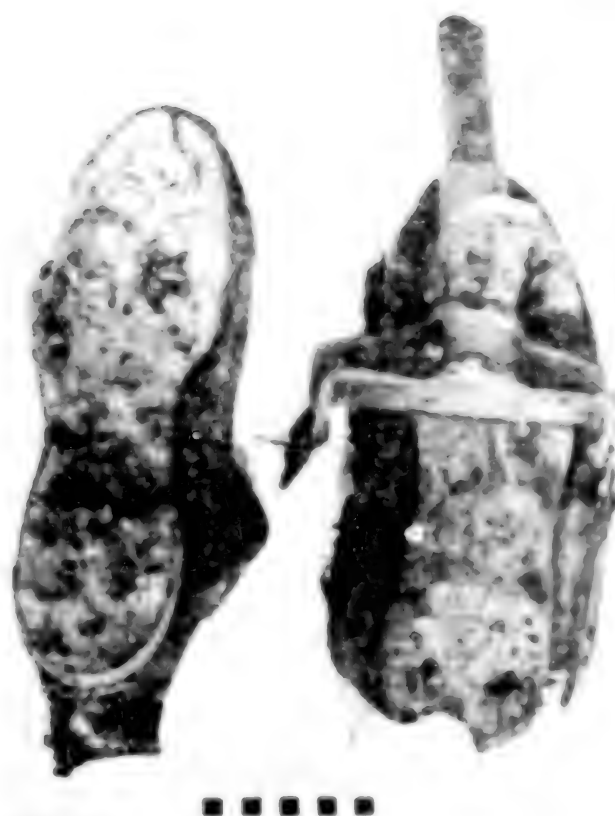


Figure 1. Airplane Control Pedal Introduced into the Sole of the Pilot's Left Shoe, and a Round Impression in the Sole of the Right Shoe (Indicated by Arrow) Exhibiting Identical Mechanism of Formation

Articles of clothing and gear belonging to the pilot also exhibit mutually located impressions following impact. As an example the safety belts may bear impressions of outer clothing and damage particular elements of its structure; the faceplate of the helmet may leave traces on its hinges, the straps of the oxygen mask may leave traces where it is secured to the interphone headset, and so on.

This pertains to all parts of the pilot's body, to articles of clothing and gear worn by the pilot, to parts of the cockpit with which the pilot was in contact at the moment of impact, and to other objects surrounding the pilot which he may have come in contact with as a result of initial body movement. However, just the material presented here is enough to



Figure 1. Impression of the surface of the body lateral window
made by Atwell on the lower part of the type of a
craft's door.

...the... and... of impressions made at the time
...the... during considerable destruction. What is most signifi-
...the... examination of the crew remained does not just simply reveal
...the... and... by clarifying the mechanism behind these
...the... information that would be valuable to the investigator
...the... circumstances of the air disaster. These
...the... obtained from analyzing the clues permits us to a certain
...the... directly or indirectly, important factors of the accident
...the... of the power and motion of the crew, the position... with
...the... the force and direction of the... the
...the... of... and... On... the...
...the... left by the remains of the crew with their...
...the... the... is...
...the... the... in...
...the... the... of the
...the... that other members of the crew at other...
...the... had... the... and
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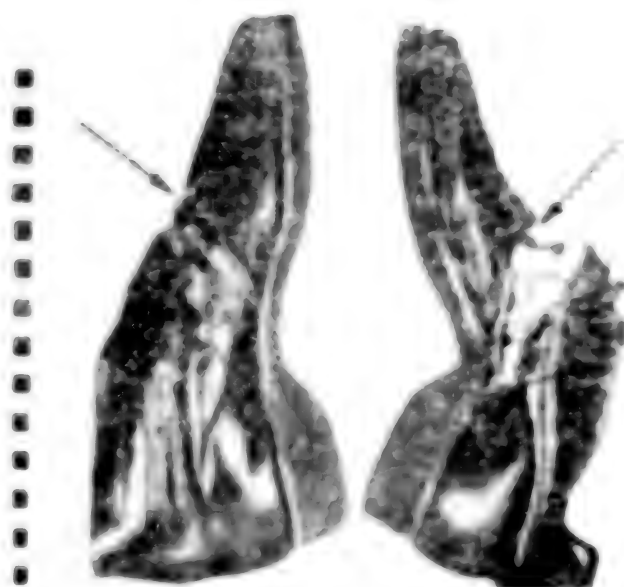


Figure 3. Inner Sides of a Pilot's Shoes: The Shoes are Flexed at the Arches, and Symmetrical Tearing of the Uppers of the Shoes (Noted by Arrows) is Observed, Being More Pronounced With the Right Shoe.

It stands to reason that the investigation is often supported by more-undifferentiated possibilities for clarifying many of the questions listed above. However, as practice has shown, information obtained from studying clues offered by the remains of the crew helps to significantly clarify and supplement data obtained by the examination commission in all circumstances. Moreover in some cases this information may even be the sole source of important data. As an example no objective recording resources are able to document the fact that a pilot may have buried his hand in a particular lever with the intention of using it, while the impression formed on the pilot's hand may reflect his intention in the emergency situation, his prediction of the subsequent course of events. This may often provide an indication of the essence of the evolved situation.

In cases where the airplane is totally lost for one reason or another, information obtained from remains may be the sole source of objective data on the overall conditions of the accident.

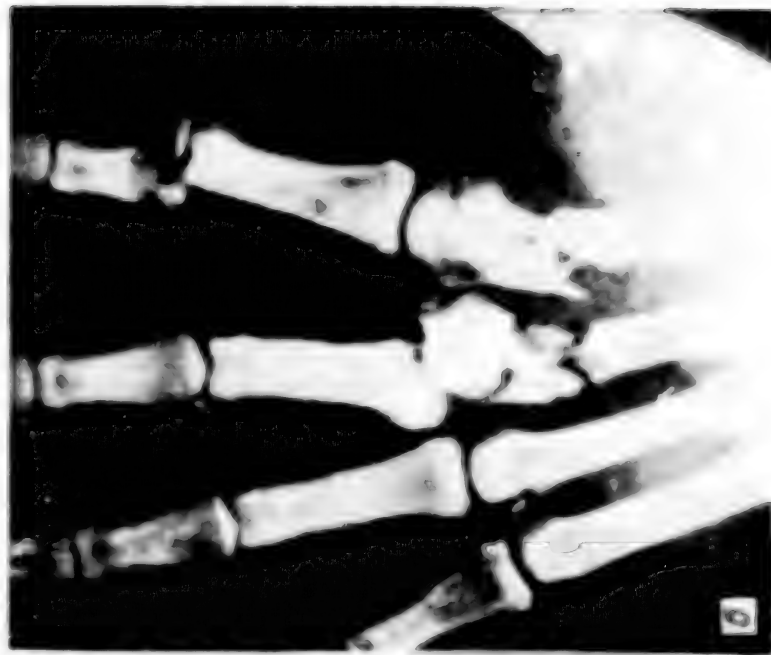


Figure 5. Typical Variant of Injury to the Palm of a Patient's Right Hand Caused by the Airplane Control Stick in Response to a Severe Shock. --Palm of the right hand with a medial ecchymotic rupture; b--X-ray of the right hand showing fractures of the second and third metacarpals.



FIG. 1. A. Degradation of the soil of a landscape of forest (bushes) and the development of a forest in the forest (bushes).

It is clear that the degradation of the soil is an important factor in the development of the forest (bushes) and the development of the forest (bushes) is an important factor in the development of the forest (bushes).

1964, 1965. "The development of the forest (bushes) is an important factor in the development of the forest (bushes)." 1970.

DEVELOPMENT OF MALTAVAMORIN GLOx FOR LEATHER INDUSTRY

Vilnius TIESA in Lithuanian 2 Aug 79 p 2

[Article by Terese Keziene: New Enzyme Preparation Is Taking a Test]

[Text] Vytautas Marazas opens one, then another incubator. Inside are only flat, clear glass containers -- petri dishes. And in each of them there is a great number of mounds, the size of the tip of a child's finger. Each mound is a separate colony containing a fabulous number -- billions of inhabitants.

The mounds on the glass dishes appear similar but the inhabitants, although bearing the common name "microorganisms," are very different. Vytautas Marazas, chief of the Laboratory of Pure Microbe Cultures at the All-Union Institute of Applied Enzymology, located in the outskirts of Vilnius, has collected 300 major groups of various microbes. He searched for them in the republic's soil and water; brought them from Moscow, from the All-Union Institute of Genetics of Industrial Microorganisms; looked for them in other republics, hoping to discover a tiny resident needed in his laboratory. But even the scientist himself was unable to describe exactly just what kind it should be.

In 1975 the All-Union Institute of Applied Enzymology was assigned a task, which was included in the State Plan for the propagation of most important scientific and technical works. The task was to create an enzyme preparation needed for new technology in pelt processing.

The K. Giedrys Industrial Pelt Processing Union of Kaunas is one of the better known in the nation; furs processed here are valued highly. But the Kaunas workers too used the old chemical technology. Just for currying the skins of local thick-skinned sheep, the enzyme preparation Maltavamorin P2x was brought in from the Kaliningrad region. Liquid is inconvenient to transport; it also had to be guarded against another danger -- rapid spoilage.

Something original, newer, and better had to be created. New microorganisms had to be found, producing enzymes that could defibrate the cell mass of the pelts, which would give them elasticity and softness. It was discovered that molds, particularly those of the aerobic family, had such properties.

Fungi of the aerobic family became the objects of research, which also attracted other workers of the Institute: Jonas Galvydis, chief of the Department

of Genetics and Physiology of Microorganisms; Algirdas Uzkurenas, head of the Laboratory of Nutrition Media, with scientific colleague Veronika Grybauskiene, a Candidate in biological sciences; the engineer-technologist Henrikas Jareckas; and Ignas Kiudulas, chief engineer of Vilnius Plant of Experimental Industrial Enzyme Preparations.

Like all molds, these microbes multiply most rapidly on the surface. It means that industrial cultivation is inconvenient, as it would require large areas. Another problem is the productivity: It is not enough to find a microorganism producing the necessary enzyme, it must also be made to work, to perform productively. Otherwise, the production of enzyme preparations would be rather expensive.

Affected aerobically, multiplying well in the media created by scientists, one group of the microorganisms being tested shortly proved itself an effective helper. They loosened skin fibers and the pelts become soft, smooth, shiny.

The results achieved in the laboratory were good. And in production?

Shipments of a yellowish-gray powder arrived at the K. Giedrys Union; scientists came to the plant. Together with Liuda Sliziene, chief engineer of the plant and Feiga Kaganskiene, head of the Central Chemical Laboratory, they observed carefully the technological process. And here the news was good. Last year, the scientific work was completed and Maltamavorin P2x and other enzyme preparations used in K. Giedrys plant were replaced by Maltamavorin G10x, in the form of a stable powder, created by Vilnius workers.

In the Central Chemical Laboratory of K. Giedrys industrial union, F. Kaganskiene takes off the shelf, one after another, albums with samples. Long-haired, multicolored sheepskins in various imitations... Only a specialist can perceive the subtleties of the technology and know whether this fur once belonged to a black-headed sheep of Lithuania or to one which had grazed in the foot-hills of Central Asia. To a consumer something else is more important -- beauty, durability, comfort.

"Although local raw material comprises only one-tenth of the materials used, it is the hardest to process," says F. Kaganskiene. "In the past, the number of operational steps had to be increased, the processing time had to be extended, and still the furs remained stiffish. Now, the local sheepskins processed in our plant rival others in softness and in beauty. They even have a superior feature -- durability."

If the Vilnius preparation can affect thick skins, it should also be suitable for all raw materials used in the plant. Tests have proven so. It is anticipated that, after a certain reorganization of the plant, the technology offered by the Vilnius workers will be introduced to the entire union, adapted for all pelts.

Maltamavorin G10x has passed a test. But far from the last one. It has now been transmitted to the All-Union Scientific Research Institute of Fur

Industry in Moscow, it is being tested extensively in the pelt processing plant unions of Baltsy, Kharkov, Kazan, and Slobodsk. And in Vilnius, in flasks at the All-Union Institute of Applied Enzymology, a new generation of the aerobic family is coming into existence.

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INTERNATIONAL COOPERATION

SPECIAL EDUCATION OF ANOMALOUS CHILDREN IN THE REPUBLIC OF CUBA (SOME RESULTS AND PROSPECTS OF DEVELOPMENT)

Moscow DEFEKTOLOGIYA in Russian No 3, 1979 pp 70-75

[Article by Guillermo Aris Beaton of the Ministry of Education of the Republic of Cuba and V.M. Yavkin of the Institute of Defectology APS USSR]

[Text] One of the important problems being solved in the process of building a socialist society is overcoming the causes responsible for the occurrence in children of deviations in physical and mental development and also creating special conditions for the education, upbringing and social-labor adaptation and rehabilitation of anomalous children and juveniles.

Prior to the victory of the revolution in Cuba, the problem of special education of anomalous children remained practically unsolved. There were even no official statistical data on the number of children requiring special education. Only one state and several private institutions existed for the training and education of anomalous children. Most children suffering from the various anomalies of development were in asylums or homes without the possibility of obtaining any kind of education or elementary labor training. Moreover, their presence in a family served frequently as the cause of conflicts among relatives, not to speak of the fact that the child required care. In consequence of this, grown-ups were kept from productive labor.

Immediately after the revolution, measures were adopted for a radical change in the position of citizens with physical or mental defects. Proceeding from humane positions and taking into account the social significance of concern for children with physical or mental defects, the Revolutionary government of the Republic of Cuba charged the Ministry of Education to create a Department of Differentiated Education, which was done in 1962 (this department was subsequently transformed into the Directorate [Direktsiya] of Special Education). The department was given the following tasks: to unite the efforts of all interested institutions and organizations concerned with children with anomalies of development; to create a special school for the education of anomalous children previously deprived of the possibility of study; to train instructors for these schools; to create most favorable conditions for full social-labor rehabilitation of physically and mentally retarded children.

The fulfillment of these tasks was significantly hindered by a lack of qualified specialists, teaching equipment and buildings for schools. Despite this, the first schools for the education of anomalous children were opened. At the present time, more than 22,000 pupils with developmental aberrations are studying. Cuba has more than 150 schools for the mentally retarded, 20 schools for children with behavioral disturbances, 15 schools for the deaf and poor of hearing, 1 school for the blind and those of poor sight and 3 trade schools conducting intense vocational training of anomalous juveniles, which is one of the main tasks of special education of anomalous children and juveniles. For the most part, labor training is done at educational-labor workshops attached to schools; in the last stage of training, the pupils undergo production practice at plants and shops. Labor training is conducted primarily in the following specialties: carpentry, metalworking, sewing, weaving, shoemaking, ceramics, construction, agriculture and art crafts.

The Ministry of Education has done much work on cadre training. Many teachers have received training in the field of defectology and special pedagogy in the socialist countries, primarily in the USSR.

At the present time, intensive work is continuing primarily along the following directions:

provision for anomalous children of special education through the expansion of a network of special schools and boarding schools, which will be carried out on the basis of detection and statistical recording of all anomalous children in the country;

creation of a network of preschool institutions for anomalous children;

raising of the scientific and practical level of training and education at special schools through the training of qualified cadres of pedagogs-defectologists with higher education and by means of the development of new educational plans, programs, textbooks, work notebooks, methodic aids and provision of schools with standard school buildings, necessary teaching equipment and the like;

use of new theoretical concepts in pedagogic work with anomalous children and introduction of new methods and techniques of instructions created on the theoretical and methodological base of Marxism-Leninism;

raising of the quality of labor training of graduates of the special schools; raising of the quality of logopedic work at special schools, expansion of the number of logopedic classes and then creation of a special type of school for children with serious speech defects;

raising of the quality of diagnostic work and bringing it into accord with the achievements of such sciences as defectology, pedagogy, psychology and the science of the medical profile.

In this connection the following principles of Marxist philosophy, pedagogy and psychology are taken into account:

training and education play a tremendous role in the process of a person's all-round development and in the development of anomalous children in particular;

in the process of working with anomalous children, it is necessary for compensation of a defect to depend on preserved analysors and to develop in every possible way their operation;

correctional-educational work should be started as soon as possible so as to achieve the best results;

labor training of anomalous children plays a leading role in the preparation of anomalous children for socially useful activity.

At the present time, the system of special education has centers for diagnosis and orientation, schools for the mentally retarded, for the deaf and hard of hearing, for the blind and weak sighted, for children with behavioral disorders, and special classes for children with speech disorders.

Centers for Diagnosis and Orientation

At the present time, a child can be enrolled in a special school only after a preliminary examination at the Center for Diagnosis and Orientation if it be found that he suffers from anomalies of physical or mental development.

At the present time, each of the 14 provinces of the Republic of Cuba and also the municipality on the Isle of Youth (the former Pinos Island) has a Center for Diagnosis and Orientation.

In conformity with the new "Statute on Centers for Diagnosis and Orientation," which became operable in 1978, diagnostic groups must include specialists of medical, psychological and pedagogic type: a child psychiatrist; a pediatrician, who carries out a physical examination of the child and, when necessary, consulting with an oculist, otorhinolaryngologist, orthopedist and other specialists in his regard; an audiometrist; optometrist (a specialist checking on acuity of vision); a pedagog-defectologist; a psychologist; a logopedist; a psychometrist; a social psychiatric worker collecting anamnestic, genealogical information and data on the microsocial situation in the family.¹

In this connection close cooperation between the Ministry of Education and the Ministry of Health is provided in the case of examination of anomalous children,

1. The audiometrist, optometrist, social psychiatric work and psychometrist are persons with secondary pedagogic education who have undergone appropriate special training at the Center for Diagnosis and Orientation, at a university or at a special secondary educational institution of the Ministry of Health; the pedagog-defectologist and logopedist are persons with secondary pedagogic education and special training at a defectological school.

since only the Ministry of Health can provide the medical part of the examination. Furthermore, in the general course of an examination, it is planned to include observation of the child at play or in free activity.

In order to determine a child's educational possibilities it is proposed that he or she be examined in the process of study activity. The creation of special diagnostic classes at diagnosis and orientation centers is planned, in which the children who are most difficult to diagnose would be sent.

In the future, the creation is planned of a National Center for Diagnosis and Orientation, which would do methodic and research work and also exercise control over diagnosis.

Schools for Mentally Retarded Children

Up to the present time, criteria for determination of mental retardation have not been sufficiently precise, which has been the cause of incorrect enrollment in special schools of children with other deviations of mental and emotional development. At the present time, there are instructions for the selection of children for schools of this type and for classification of mental retardation that have been developed and are now being used. Statistical research has been done which shows that of children of preschool age about 1.19 percent are mentally retarded, and determination was provided of oligophrenia, dementia, arrested psychic development and other conditions. It was shown that schools for the mentally retarded should not enroll children with arrested psychic development, with cerebro-asthenic conditions and with a number of other deviations.

Mentally developed children are taught according to special programs for each of the general educational subjects. In addition, in the 4th year class their labor training is started; it is completed in trade schools or workshops attached to plants under the guidance of specially trained foreman. Education in special schools for the mentally retarded is at the present time planned for nine years; this includes a maturation class (madurez), a class of initial training (inciacion), 1st-5th year classes and two levels for the 6th year class (6A and 6B).

General educational subjects at the special school for the mentally retarded are the same as at elementary school, but their programs differ as to content and selection of material and its distribution by years of study. At the same time, it should be pointed out that programs for special schools are still far from being perfected.

At the present time, the country still has few schools providing an uninterrupted pedagogic process, starting with the very beginning of education of a mentally retarded child to his graduation from school. In a number of provinces, three-stage schools for mentally retarded children exist: 1st stage (or school for the children), including a maturation class, a class of initial teaching and 1st year to 3rd year classes; the 2nd stage (or school for juveniles), including 4th and 5th year and both levels of the 6th year class; and the 3rd stage--a special trade school.

Long-range plans of the Ministry of Education provide for the gradual expansion of the network of unified schools, which would offer both general and vocational training of mentally retarded students. The construction of special schools according to standard plans is already under way.

The special schools also provide logopedic assistance to the pupils, most of whom have disturbances in speech development.

For the improvement of special education, work is being done on modifying teaching plans and programs, developing special textbooks² and work notebooks for schools of this type.

Furthermore, and this is very important, it is planned to offer the opportunity to all mentally retarded children to study at special schools, since at the present time a part of these children are not studying at all, while a part are studying in general educational schools.

Schools for the Deaf and Hard of Hearing Children

Schools for deaf and hard of hearing children are also at the present time in a stage of improvement of teaching plans, programs and methods. There are schools with an 11-year period of study for children lacking preschool special training and 9-year schools for those who have received preschool training in the period of 1.5 to 5.5 years of age. In both cases, the children, following completion of the special school, obtain an education within the limits of the six classes of general educational (elementary) schools.

Organization of labor training in schools for the deaf and hard of hearing is approximately the same as in schools for mentally retarded children.

Because of a lack of places in special schools, not all deaf and hard of hearing children receive training. Furthermore, no exact data exist so far on children with these types of anomalies, nor are there figures for other types of anomalous children, which hinders planning of the work. In 1979 it is planned to carry out a complete statistical recording of all anomalous children. Existing schools are not broken down into schools for the deaf and schools for the hard of hearing, and frequently children with a varying degree of loss of hearing (deaf and hard of hearing) are to be found in one and the same class. Many schools are unable to provide the necessary labor training because of the lack of a corresponding material-technical base.

Special attention at the present time is being paid to:

provision of special schools of this type with modern educational programs, development of textbook and work notebooks;

provision of education for children with hearing disturbances from an early age;

2. At the present time, these schools make use of textbooks for elementary general educational schools.

employment of the best and most effective methods for more rapid attainment of speech;

detection and recording of all children with hearing disorders in Cuba;

reduction of the years of study to provide an elementary education for the deaf and hard of hearing; creation of a system of secondary education for these children.

At the present time, many of the indicated problems are on the verge of solution. An experiment is being conducted on teaching speech on the basis of the use of dactylology, which is being widely employed up to the 2nd year class at the Cheche Alfonso Base School for the Deaf and Hard of Hearing. This work was started in 1975 under the guidance of T.S. Zykova.

In the 1976/77 school year, the creation of a secondary school for the deaf and hard of hearing was started, and at the present time nine classes are already in operation. Much work is also being done on including in specialized education of children of preschool age with hearing disorders. In 1978, the Society for the Deaf of the Republic of Cuba was established.

School for the Blind and Weak Sighted

In the school for the blind and weak sighted, educational programs do not differ in scope of material from programs of mass schools. Its special features lies solely in methods of teaching reading, writing and other subjects, in the presence of special subjects providing rehabilitation of the blind and weak sighted and in special labor training. But the last-named is hampered by the absence of the necessary material-technical base.

The school for blind and weak sighted children has a structure comparable to the general educational school, the difference lying only in the preschool stage to which much attention is paid as being a preparation for entrance into school. The school has two divisions: one is for the blind, the other is for the weak-sighted. In addition, special classes exist for blind mentally retarded children.

The school has elementary and secondary levels of education, each consists of two cycles: 1st through 4th year classes (1st cycle) and 5th-6th year classes (2nd cycle) constituting the elementary level; 7th through 9th year classes (1st cycle) and 10th through 12th year classes (2nd cycles)--the secondary level. Thus on completing the school, the pupils have a complete secondary education.

The teaching plans of the school for the blind and weak-sighted provide for improvement of programs and the teaching of a number of special subjects: recognition of the environment, Braille writing, typing and labor training, physical culture, music and the fine arts.

In the 1982/83 school year, the reorganization of the system of teaching the blind and weak sighted is expected to be completed. In the immediate future, a special school for adult blind people will be opened.

In 1978, the Society for the Blind of the Republic of Cuba was created.

School for Children with Behavioral Disorders

In the special education of the Republic of Cuba, there are also schools in operation for children with behavioral disorders, that is, disorders in the forming of the personality under the conditions of a normal intellect. Children study at these schools who have persistent behavioral disorders expressed in psychic and motor lack of control, psychic inhibition, expressed in neurotic disorders, vagrancy, inclination to thievery, pathological lying, aggressiveness, tendency for committing antisocial acts, and so forth.

A special teaching regime exists in schools of this type: no more than 15 pupils make up an educational and training group; this makes it possible to engage fully and regularly in individual work with the children. Quiet and mobile games, drawing and the like are used for psychotherapeutic work carried out by a teacher-psychotherapist.

In schools of this type, the same subjects are studied according to the same programs that are used in general educational schools; this makes it possible to return the child to a general educational school following correction of the disorder.

In the process of improvement, provision is made for a more clear-cut determination of the contingent of pupils of these schools: to strictly observe the principle according to which pupils stay in these schools only to the moment of stable correction of defects in their behavior; to improve the system of pedagogic influence for psychotherapeutic purposes, which makes it possible to overcome and correct personality disorders existing in the children; to have the school maintain close contact with a child psychiatrist for more complete correction of behavioral disorders.

Logopedic Service

At the present time, a program of work is being developed which will have to be conducted by the logopedic services both in general educational and in special schools. In this, the need is taken into account of logopedic work with all children who have speech disorders, since these disorders, as shown by statistical data obtained in centers for diagnosis and orientation, are one of the causes (and a most significant one) of failure at school in elementary classes. In accordance with an order of the Ministry of Education, special classes for children with speech disorders are created in elementary general educational schools; studies are conducted in these classes for

children with nonsevere speech disorders under the supervision of a teacher-logopedist. It is planned to open the necessary number of such classes in all of the country's provinces. In 1980, there is planned the opening of a special school for children with severe speech disorders. At the present time teaching plans, programs and textbooks for schools of this type are being developed. In the future, the creation of preschools divisions in schools for children with speech disorders is planned.

The system of special education in the Republic of Cuba is being developed and improved. Thanks to methodological consultations with specialists from the socialist countries, principally the USSR, the quality of education and training of anomalous children is being raised.

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DEVELOPMENTS IN PHYSICAL EDUCATION OF PRESCHOOLERS

Moscow DOSHKOL'NOYE VOSPITANIYE in Russian No 6, 1979 pp 9-11

[Article by V. Listrovaya and N. Makel'skaya of the RSFSR Ministry of Public Health: "On the Medical Supervision of the Physical Development of Children"]

[Text] Over the entire history of our state, the Communist Party and the Soviet government have continuously devoted great attention to the health protection and development of the younger generation. The CPSU Program states that the party considers one of its most important tasks to be to provide the raising, beginning from earliest childhood, of a physically strong younger generation with a harmonious development of physical and spiritual forces.

The development of a healthy child cannot be provided merely by carrying out medical measures. This includes an entire system involving both the creation of optimum environmental sanitary and hygiene conditions under which the child lives, the correct raising of the child, the organization of rational and scientifically based nutrition, and the prevention of various deviations in the state of health. The physical development of children holds a significant place in this system, and this is of particularly great significance in preschool age, when the bases of good health are established, when important motor skills and abilities are developed, and hygienic habits are instilled.

The socioeconomic changes in our nation, the scientific advances, and the improvement in the quality of general medical aid to children have helped to improve the physical development and health state of the children being raised in the preschool institutions.

The previously noted differences in the physical development of children who attended preschool institutions and who were raised at home have been eliminated. Moreover, with an increase in the time the children spend in preschool institutions, the indicators of physical development have improved.

The morbidity rate of children has also declined. Thus, over the last 5 years in nurseries the pneumonia rate has been reduced by 8.7 percent, acute dysentery by 61.7 percent, measles by 7.7 percent, and whooping cough by 16.6 percent; in the garden-nurseries the figures, respectively, have been 6.7 percent for pneumonia, 64.0 percent for dysentery, and 6.4 percent for measles.

In the structure of child morbidity in the urban preschool institutions, acute respiratory infections and flu hold first place, pneumonia is second, and acute dysentery third.

At the same time the presence of a rather high percentage of young and preschool children with chronic nonspecific respiratory illnesses, cardiovascular diseases, posture problems and incipient forms of deformations in the skeletal and muscular system cannot help but be linked with the problems of the physical development of the children.

The work done by the Scientific Research Institute for the Hygiene of Children and Juveniles under the USSR Ministry of Public Health has established that the organization of adequate locomotion (its organizational forms and free activities) corresponding to the particular features of preschoolers and the conducting of physical exercises during walks year-round help to raise the level of physical development and the conditioning of the children, to reduce the incidence of acute respiratory diseases and lower the number of frequently ill children.

The research of the Moscow Scientific Research Institute for Pediatrics and Pediatric Surgery under the RSFSR Ministry of Public Health has shown that with the correct organization of all aspects of exercise even after 3 or 4 months of conducting systematic local or general baths, the responses by the child to a cold stimulus declined sharply in young and preschool children, and this is an indicator of the training of the children and the resistance of their organism to reduced temperatures. Here appetite and sleeping improved in the children, emotional tone increased, and the rate of acute respiratory infections in the children declined by 2-3-fold.

As of January 1978, there were around 7 million children in the RSFSR preschool institutions. The presence of such a large contingent of children within the public health and public education bodies as well as all the concerned departments and organizations to pay particular attention to the questions of correctly organizing the operation of preschool institutions.

All general medical aid to children in preschool institutions is carried out by the preschool and school departments of the children's polyclinics, as these are the organizational-procedural and therapeutic-consultative centers. These departments provide the entire range of medical and sanitary services for children in the preschool institutions, they coordinate general medical work of the polyclinics and preschool institutions, and also organize special aid.

The medical physical culture dispensaries have a large role to play in implementing measures in the area of proper physical development of the children and medical supervision. In the RSFSR there are around 240 medical and physical education dispensaries (VFD), and 22 of them have children's departments, while in the remainder physicians responsible for the organizing of the physical development of children have been assigned. In addition, the medical and physical culture service has 998 medical supervisory offices and 3,772 therapeutic physical culture offices under the children's polyclinics and hospitals.

For the purpose of studying the condition of the physical development of children in the preschool institutions, the VFD systematically inspect and analyze the work on the spot and the results are discussed at conferences of public health and education workers (for example, the oblast VFD of Novosibirsk, Vladimir, Kemerovo, Chelyabinsk, and elsewhere).

The VFD carry out extensive work in improving the skills of the employees in the preschool institutions in the area of the physical development of the children.

On the basis of the best children's preschool institutions, schools of advanced experience are organized and here all the forms of physical training and medical supervision of this are improved, personnel training is provided and the skills of the physicians and middle-level medical personnel are improved.

The creation and preparation of the schools of advanced experience are carried out by the dispensaries jointly with the rayon, city and oblast public education bodies (for example, the oblast VFD of Rostov, Novosibirsk, Volgograd, the Khabarovskiy Kray VFD, and elsewhere).

The forms for skill improvement employed by the VFD vary. For example, there are permanent seminars in the base preschool institutions, where practical exercises are conducted with subsequent investigation and analysis of the content of the exercises.

In the dispensaries, children's polyclinics and children's clinical hospitals, permanent courses are organized for the personnel of the preschool institutions.

A number of the VFD conduct traveling seminars on the spot (the Saratovskaya and Volgogradskaya oblast VFD, the Volzhsk city and others).

Along with improving the skills of physicians in the area of the physical education of children in preschool institutions, great attention is given by the dispensaries to work with the middle-level medical personnel. Thus, the employees of the Saratovskaya Oblast VFD participate in the training of nursery nurses at courses of the city health department on the basis of the preschool office of the institute for the advanced training of teachers.

In using the established and proven forms for improving the skills of the workers in the area of the physical education of children, the dispensaries are also at work seeking out new, more effective forms and methods. Thus, the Saratovskaya Oblast VFD has organized permanent regional seminars which operate under a single plan of the oblast health department, the oblast public education department and the oblast committee for physical culture and sports with the participation of physical culture instructors and coaches from the children and youth sports school.

In addition to the permanent seminars, 1-day seminars are also held for the workers of the preschool institutions in the rayons and who have already received 2-3-week training at the dispensary.

For improving the knowledge of the medical workers in the area of organizing the physical education of children in the preschool institutions, the VFD physicians have worked out procedural letters, sets of massage and physical exercises, and standards for the physical development of preschoolers (the oblast VFD of Saratov and Volgograd and the Volgograd city VFD and others).

In addition to organizational and procedural work, the republic VFD carry out great therapeutic work. Examinations of the children are organized for the purpose of detecting flatfootedness, posture problems and deformation of the spine. Children with a discovered pathology receive the required treatment including corrective gymnastics, general massage and physical therapy procedures.

For example, under the Tdzhumurt Republic VFD a children's department of therapeutic physical culture has been opened, and here 205 children receive treatment simultaneously.

The beneficial effect of swimming on correcting problems of the skeletal and muscular system in children is well known. A number of the VFD have taken the initiative in organizing exercises in swimming pools and medical-pedagogical supervision over the children engaged in swimming (the Chailynskaya Oblast VFD, the Volzhsk and Volgodonsk city VFD).

The Araratian republic VFD together with the city public education department has organized skiing exercises in the preschool institutions.

Great attention is also given to carrying out health education work with the parents of the preschoolers. The Saratovskaya and Vladimirskaia Oblast VFD have published health bulletins on the physical development of children. The Kemerovskaya Oblast VFD together with the house of health education has published pamphlets on "Preventing Posture Problems in Children," "How to Prevent Flatfootedness," and others. The Chelyabinsk VFD, the highway and city dispensaries and the Volgogradskaya VFD publish materials on the physical education of children in the local newspapers.

For the purposes of improving the organization of physical education for children, much initiative has been shown by the employees of the preschool institutions. For example, in Angarsk (Irkutskaya Oblast), a competition has been announced for the best institution in the area of the physical education of children.

In the nursery of Kirov, for the purpose of providing a systematic conditioning of the children, on the territory of the facility a stream has been created the sides and bottom of which have been concreted, hot and cold water is piped in, and this makes it possible to adjust the water temperature. The children play willingly in the stream and go barefooted.

In the preschool institutions of Tula, at parent meetings they demonstrate the conditioning method, and the importance is explained of the continuous carrying out of the conditioning procedures in the institution and at home.

An analysis of the morbidity level and the dynamics of the physical development of the children as carried out by the preschool institutions and children's polyclinics over a number of years during which planned and systematic work was provided in the area of the physical education of children has shown an improvement in the health of the preschool children. For example, according to the data of the interrayon VFD of Voroshilovskiy Rayon in Volgograd, the percentage of children with posture problems in 1976 declined from 7 to 4.9 percent in comparison with 1974, from 1.8 to 1.1 percent with scoliosis, and from 2 to 2 percent with flatfootedness.

In the preschool institutions of Severodvinsk in Arkhangel'skaya Oblast, for example, the percentage of illness-free children increased by 4-5-fold during the period of their adaptation; in the preschool institutions of Izhevsk, the sickness rate for acute respiratory infections and flu declined by 1.5-fold; the physical development of children improved in the preschool institutions of Ordzhonikidze in the Northern Ossetian ASSR, where the percentage of children with average and above-average physical development increased from 84.8 percent in 1971 to 95.7 percent in 1976.

At the same time, there still are serious problems and unsolved questions in the organization of health protection and physical education of children in the preschool institutions.

Training for pediatric-specialty nurses is not being sufficiently organized at the special departments of the medical schools.

Not all the children's polyclinics have as yet become the organizational-procedural and therapeutic-consultative center for the correct organization of medical and health services for children in the preschool institutions.

The children's polyclinics are still not doing sufficient work to prepare the children for admission to the preschool institutions. The corresponding regime for bringing home conditions closer to the conditions of the

preschool institution has not been worked out, the diet is not adjusted, and there are not always preliminary examination and general strengthening therapy for weakened children before admission to the preschool institution. At the same time it has been established that the sickness rate of the newly admitted children during the period of adapting to the new conditions is 2-3-fold higher than for children of the same age but who have attended the preschool institutions for a long time.

The physicians and nurses are not always familiar with the physical education procedures for the children of the various age groups or the principles of organizing the exercises. Massage and gymnastics for 2-year-olds as before are prescribed most often only for weak children who have health problems, these exercises are frequently conducted incorrectly, and often they are carried out by nurses who do not have special training.

There is insufficient medical and pedagogical control over the conducting of physical culture exercises, morning gymnastics, running games and sports amusements. There is no consideration of the physical stress in the exercises, the physiological curve and the concentration of the exercises are not determined, and no assessment is made of the external indications of fatigue.

There are also difficulties in supplying the preschool institutions with the required physical culture equipment, individual aids for physical education, and furniture which corresponds to the growth and age features of the children.

For the purpose of improving the organization and effectiveness of physical education for children in preschool institutions, work must be continued in redesigning the children's departments at the VFD considering their category, in staffing the physician positions, and supervising the physical education of children by pediatricians.

The VFD must strengthen organizational and procedural leadership, they must systematically train and improve the skills of physicians, nurses and pedagogues at the preschool institutions in the area of medical and medical-pedagogic supervision over the correct organization of physical education in the preschool institutions, they must analyze the effectiveness of the measures in the area of the physical training of the children, and provide an expert evaluation of physical development, using local standards.

The children's polyclinics should pay more attention to organizing the physical education of the children in the preschool institutions, to the hygienic spacing of the rooms and equipment, and they must improve the quality of the medical examinations of the children, including an estimate of the state of health, the physical development of the children and their functional capabilities, as well as provide prompt improvement and treatment of a detected pathology.

The organization of the physical education of preschoolers is an interdisciplinary problem the solution to which involves the public health and education bodies as well as other interested departments. Only their joint, purposeful and coordinated activities can be the guarantee for successfully carrying out the physical education of the children and strengthening their health.

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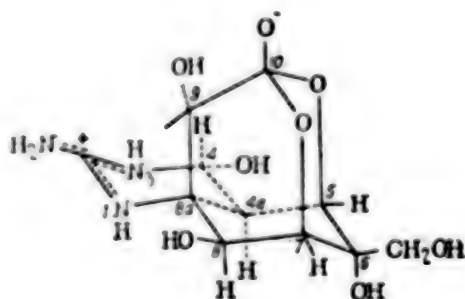
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RECOVERY OF TETRODOTOXIN AND HOLOTHURIN FROM DOMESTIC RAW MATERIAL

Moscow FARMATSIYA in Russian No 4, 1979 pp 27-31

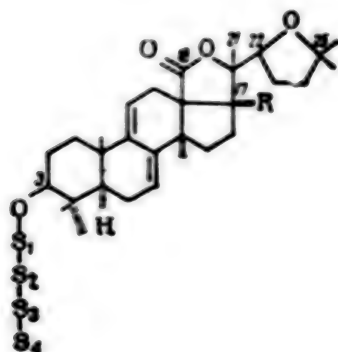
[Article by I. S. Azhgikhin, V. G. Gandel', S. D. Mekhtikhanov, N. V. Serebryannikov, N. A. Akesenova and V. V. Finkel', All-Union Scientific Research Institute of Marine Fishing and Oceanography, USSR Ministry of the Fish Industry, Moscow, submitted 14 Mar 78]

[Text] Tetrodotoxin and holothurin are referable to the so-called "first generation biologically active substances (BAS) of marine organisms," the discovery of which was greatly instrumental in drawing the attention of researchers to hydrobionts as a new source of drugs. Chemically, tetrodotoxin is an aminoperhydroquinazoline derivative of rather unique structure, which was identified in 1964:



Tetrodotoxin has the unique capacity of influencing permeability of the cell membrane to sodium ions, which renders it irreplaceable in the study of basic properties of cell membranes. Pharmacologically, tetrodotoxin is a compound with typical neurotropic activity. Tetrodotoxin also has a significant vasodilating action. Tetrodotoxin was first used in clinical practice as a potent analgesic for the neurogenic form of leprosy [1]. Under experimental conditions, the effective dose of tetrodotoxin, which induces prolonged analgesia, constitutes only a few micrograms per animal (sheep). At the present time, several products have been proposed abroad, which are based on tetrodotoxin, for infiltration and spinal anesthesia.

Holothurin, which was first isolated from the Caribbean holothuri is a steroid saponin. Its structural formula is:



Holothurin attracted attention because of its cytostatic activity with regard to some malignant neoplasms, as well as a biologically active substance characterized by neurotropic action and capacity to stimulate phagocytosis [2].

Experimental Section

Hydrobionts, which are the permanent and numerous inhabitants of Soviet territorial waters (Gulf of Pos'yet and Bay of Olga), the Fugu niphobles and Stichopus japonicus, caught in May-June of 1977, were used to isolate tetrodotoxin and holothurin.

Isolation of tetrodotoxin: We homogenize 1 kg liver from Fugu niphobles in 2 volumes of methanol in an RT-1 tissue macerator at 8000 r/min for 3 min. The obtained homogenate is diluted in methanol to 2.5 l and stirred for 5 min, after which it is acidulated with 16% sulfuric acid in methanol until a suspension with pH 1.67 is obtained, then it is again stirred for 2.5 h at room temperature. The suspension is filtered through a pleated filter, the residue is reextracted in 1.25 l acidulated methanol and filtered.

The combined filtrates are mixed with 5 volumes of acetone at room temperature, and the pH is brought up to 6.8 with dilute ammonia hydroxide, after which they are mixed again for 1 h, and the suspension is allowed to stand for 10 h. The supernatant is decanted, while the sediment is suspended in 150 ml distilled water for 1 h, then filtered through a pleated filter. The sediment is reextracted in a small amount of water. The aqueous fractions are combined, and the pH is brought up to 7.0.

Purification of tetrodotoxin by ion-exchange column chromatography: A mildly acid cation exchanger of domestic manufacture, KRK-1-5P (TU 10 P 403-70) is used, in a fraction of 0.25-0.50 mm, the specific volume of the cationite swollen in water constituting at least 1.5-2.5 mg/g. The cation

exchanger is used in the saline form (NH_4^+). For this purpose, 200 g thereof in acid form (H^+ form) is placed in a separating funnel with ground glass stopper and washed in aliquots of freshly boiled distilled water until cloudiness disappears and the washings are no longer yellow. Then the cation exchanger in the separating funnel is treated with 4% ammonia hydroxide, with periodic shaking for 2 h, the solution is decanted and replaced with a fresh batch. This procedure is repeated twice. The cation exchanger is then washed in distilled water on a glass filter until free alkali are removed. The wet cation exchanger in the beaker is covered with distilled water and, after stirring it, it is transferred in two operations into a glass chromatography column (80×2).

The combined aqueous fractions containing tetrodotoxin at pH 7.0 are applied to the prepared column with ion-exchange resin, keeping the flow rate at 2-3 drops per min, and the pH of the outflowing fluid is 7.1. After applying the toxin, the column is thoroughly washed in distilled water (5 parts distilled water to 1 part resin). The biologically active substance is eluted in 240 ml 10% acetic acid, then 300 ml distilled water. The microcrystalloscopic method is used to analyze the fractions for tetrodotoxin content. A drop of eluent is placed on an hourglass and a drop of saturated picric acid solution is added; after a few minutes, the tetrodotoxin picrate is identified under a microscope. The microcrystals of tetrodotoxin picrate have a typical shape (Figure 1). Fractions containing the toxin are concentrated in a vacuum to 150 m.

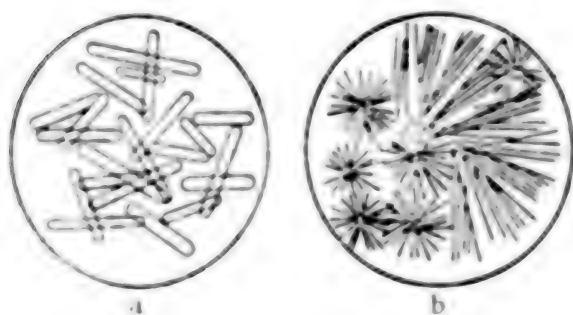


Figure 1.

Microcrystals of tetrodotoxin picrate

- a) slow crystallization
- b) rapid crystallization

To the concentrate we add ion exchanger ARA-8P (OH form, fraction 0.25-0.50 mm, TU [technical specification] 6-09-10-846-73) until a solution is formed with pH 6.5 ± 0.05 . The anion exchanger is then separated using a No 4 glass filter, and washed in small aliquot amounts of distilled water; all liquid phases are combined and applied to a column with cation exchanger KKK-1-12P in the sodium form (Na^+ form). A mildly acid cation exchanger of domestic manufacture, KPK-1-12P (TU 10P 542-71), fraction 0.25-0.50 mm, specific volume of swollen cation exchanger in water at least 1.3-2.3 mg/g, is used in the sodium form, for

which purpose the acid form of the cation exchanger (H^+ form) is changed to the sodium form by treating the resin with 1 N NaOH using the method described above.

The tetrodotoxin solution with pH 6.5 ± 0.05 is applied to the column in an amount constituting 1/15th solution to 1 volume resin per hour, and the pH of the outflowing fluid is 7.3. After applying the solution of the biologically active substance, the column is washed in 2.5 volumes of

distilled water and eluted in 1 N solution of acetic acid at the same rate as when applied. Tetrodotoxin is eluted in the pH range of 6.5-4.0. The fraction is tested for tetrodotoxin content by the microcrystalloscopic method with picric acid (see above). Fractions containing tetrodotoxin are concentrated under vacuum to 50 ml, and the pH of the concentrate is brought up to 6.0 using anion exchanger ARA-8P in the hydroxyl form. The anion exchanger is separated through a glass No 4 filter and washed in equal amounts of distilled water. The pH of the combined solutions is brought up to 8.2 with a diluted solution of sodium carbonate and left to settle for 24 h at room temperature. The sediment is separated by centrifugation and washed in a small amount of water.

The precipitated tetrodotoxin is dissolved in a small amount of diluted acetic acid at pH 4.8-5.0. The insoluble sediment is separated by centrifugation. The pH of the supernatant is brought up to 7.0 using diluted sodium carbonate solution. Upon appearance of tetrodotoxin crystals, we continue to add sodium carbonate to pH 8.2. Centrifuging is performed to separate the tetrodotoxin crystals, and they are washed in a small amount of distilled water. Crystallization is repeated 3-4 times for more complete purification of tetrodotoxin. The degree of purification of tetrodotoxin is determined by chromatography in a thin layer of sorbent.

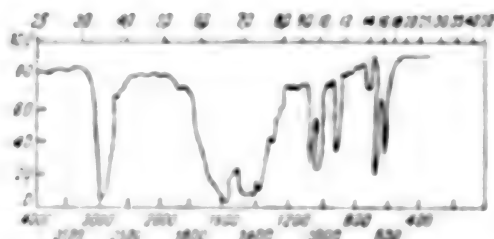


Figure 2.

Infrared spectrum of tetrodotoxin

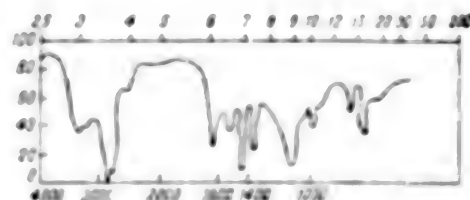


Figure 3.

Infrared spectrum of Holothurin A

The repeatedly reprecipitated crystalline tetrodotoxin is identified according to Tisher et al. [3] and Goto et al. [4]: melting point (the specimens turn dark starting at 225-227°C and do not melt at 300°C), thin-layer chromatography (Rf 0.3), infrared spectrometry (Figure 2) and biological tests (intake of tetrodotoxin by white mice induces death of all animals due to asphyxia within 1-7 min).

Isolation of holothurin: Pieces of Japanese holothuria (*Stichopus Japonica*), cut up and macerated in a tissue grinder (at 8000 r/min for 2 min in the presence of hot distilled water, total of 5 l water), in amounts of 2.5 kg are boiled for 5 min, then filtered. After filtration, the residue on the filter is washed in a small amount (150-200 ml) hot distilled water and put with the filtrate. The latter is evaporated in vacuum to a volume

of 300 ml and mixed with 96% ethanol until a concentration of 63-64% is obtained. This is associated with formation of a dark sediment that is removed by filtration. The sediment on the filter is washed once in 300 ml slightly warmed 64% ethanol and combined with the filtrate. The alcohol solution of the saponin fraction is evaporated under vacuum to a volume of 80-90 ml. The thickened (to the consistency of sour cream) solution is decanted into 2000 ml 96% ethanol, and there is formation of a light tan sediment of saponin fraction in an amount of 18-20 g. The sediment is filtered off on a No 2 glass filter, washed in 100 ml 96% ethanol and vacuum-dried.

The dry extract is dissolved, while stirring, in 85% ethanol at 55°C and left to stand for 24 h for crystallization of saponin, which will appear in the solution upon isohydric crystallization in the form of elongated light yellow particles. They are separated, washed in a small amount of alcohol and vacuum-dried (the sample weighs 3 g).

The recovered holothurin was identified according to Chanley et al. [2, 5]: melting temperature of the sample of saponin and isolated genin is 225-227°C (with decomposition) and 270-272°C, respectively, thin-layer chromatography of saponin, genin and sugars, infrared spectrometry (Figure 3) and biological testing (intraperitoneal injection of 1 mg saponin in 0.2 ml water to white mice induces death of all animals within 24 h).

Conclusions

1. *Fuga niphobles* and *Stichopus japonicus* that inhabit Soviet territorial waters were caught in the region of the Gulf of Pos'yet in May-June 1977, and they were found to be usable raw material for recovery of tetrodotoxin and holothurin.

2. The methods for isolating, purifying and identifying tetrodotoxin and holothurin can be used on the large scale of laboratory production of tetrodotoxin and holothurin.

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PSYCHOTHERAPY METHODS AND EFFECTIVENESS DISCUSSED

Moscow MEDITSINSKAYA SESTRA in Russian No 4, 1979 pp 34-36

[Article by V. E. Levi]

[Text] The ancient philosophers said that a physician treating a patient must make use of three mighty resources--the word, the herb, and the knife. And in fact, the word plays a tremendous role in medical practice in addition to medical therapy, and it is one of the active weapons of psychotherapy.

Psychotherapy is defined as integrated therapeutic influence, by means of various resources, upon the mind of the patient, and through it upon the entire body with the purpose of eliminating pathological symptoms and altering the patient's attitude toward himself, toward his condition, and toward the environment.

The principal means of such influence is the word which, as we know, cures, though unfortunately it can also do harm. Moreover, as experience shows, the same drug may benefit one patient and do nothing for another patient with the same disease. This happens because the therapeutic influence of medicine must be reinforced by the effect of the physician's personality upon the patient, by his authority.

Medicine divides all diseases into two groups--functional and organic. In the presence of functional diseases there is no anatomical damage to individual organs or tissues in the body. Only their functions are temporarily disturbed. For the most part these functions are easily restored. With organic diseases changes inevitably occur in tissues and organs. In contrast to organic disorders, functional disturbances yield well to the influences of psychotherapy. Organic disease is often accompanied by functional disturbance. In such a case it is easier to surmount the disease following elimination of the functional problem by psychotherapy. As an example acute infarction of the myocardium is often accompanied by disturbance of the nervous system and persistent insomnia. Clearly, elimination of insomnia would dramatically improve the patient's mental state and thus help him to quickly rid himself of his principal illness.

It should be emphasized that we cannot address treatment in each concrete case before studying the patient, his experiences, his philosophy, and his character. It is not always easy to gain an understanding of the patient's inner world, or conduct an intimate psychotherapeutic discussion with him. This is where personnel need patience.

Physiology has proven the possibility for influencing a patient's physical state and the function of his organs with words, by suggestion. We know quite well that when agitated, some people become pale, others turn red and form droplets of perspiration on their face, some begin to hiccup, and many experience a rise in heart beat. Just the thought of a fly in the soup can cause vomiting in an impressionable person. What this says is that strong impressions, experiences, agitation, and "emotions" have a reflection upon the activities of internal organs. Experiments conducted by the well known American physiologist Cannon demonstrated that under the influence of emotions (fear and so on), the blood epinephrine concentration changes, the concentrations of fatty acids and glucose in the blood increase, and blood coagulability rises.

I. P. Pavlov's technique for studying conditioned reflexes illustrates even more persuasively the influence of emotions upon digestion. Observations made by Soviet and foreign scientists show that an individual's mental state influences the activity of internal organs and, on the other hand, that disturbance of the functions of these organs has a reflection upon the individual's mood, upon his mental activity. The diencephalon and its autonomic centers communicate by an entire series of nervous conductors with every organ in our body, and every organ has its "representation" in the diencephalon. This communication is precisely what makes mental influence upon activities of visceral organs possible. While in former times psychotherapists tried to "influence" an individual symptom in an attempt to eliminate it alone, our present-day understanding of the body as a single whole requires an influence upon the body as a whole.

We know quite well that persons overanxious about their health constantly listen to what is going on "inside"--to the activity of the heart, the stomach, and other organs. It is entirely understandable that an ignorance of the fundamentals of medicine and a consequent incorrect interpretation of existing symptoms invariably lead patients to an incorrect evaluation of their condition. In such cases where illness elicits anxiety and alarm in the patient, before choosing a particular method of psychotherapeutic influence the physician must deeply study the patient's character and the features of this personality, and he should conduct several interviews with him in order to tune the patient into himself, to establish internal contact with him. The physician must be able to persuade the patient of the groundlessness of his fears, and relieve his depression. This method of psychotherapeutic discussion with the patient is the basis of rational psychotherapy.

In addition to direct suggestion, we can make use of so-called indirect suggestion. In this case general reinforcing medicines of one sort or another or physiotherapeutic treatments are prescribed to the patient, and it is simultaneously suggested to him that these are significant therapeutic measures that would have a positive influence upon his disease.

Special conditions raising attention and calmness are created in the treatment rooms; anything that may distract the patient or elicit "competing" activity (incidental talk and actions having no bearing upon the manipulations being performed) is excluded.

Physiotherapeutic treatments are preceded by psychotherapeutic preparation with a tape recorder. Patients hear the following in headphones: "Notice how everything becomes better and better for you with every session, how your strength multiplies...."

Elements of deontology are also an organic part of psychotherapy. The physician must try to apply his special knowledge with the greatest benefit to the patient. It is in correspondence with this that he organizes his work and his mutual relationships with his colleagues and the patients themselves. This medical deontology has the purpose of improving therapeutic work.

Crossing the threshold of the therapeutic institution, the patient must feel that he has entered an atmosphere of benevolence and attention toward him. The nurse must find the key to the sick individual's personality and create the needed psychological climate in relations with him. Sometimes she must give way to the patient in some manner, while at the same time tactfully but firmly and persistently demanding him to comply with all of the rules and prescriptions, and compel him to adhere to the existing routine. And it stands to reason that she must avoid carelessness, indifference, and formalism in her work.

Let me emphasize once again the great role the word plays in therapy. Spoken at the right time and affectionately, words of comfort and sympathy raise the patient's hope of recovery or improvement. It is not enough to just prescribe and give the patient medicine. It is also important to do this in the right way. It stands to reason that medicine should be given to the patient at a strictly prescribed time. This act must not appear random, as something done in passing. The patient must see that the nurse is following the physician's orders with due attention. And if the medicine is given to the patient together with kind and concerned words, its effect could necessarily be better. Not only words in themselves but also their intonation and, in general, the nurse's entire manner have great deontological significance. Medical personnel of all ranks are always around people, always in the public eye. The therapeutic institution is evaluated on the basis of their countenance, behavior, work style and, finally, their characters. Unfortunately we still encounter cases of iatrogenic diseases arising as a result of an incorrect approach taken to the patient by the

physician or other medical workers. "You have an ulcer and diabetes," patient V. heard from her physician. "You could never survive the operation, and I simply don't know what we are to do with you." Another young female patient was told: "It looks like lung cancer. How many children do you have? One daughter? Well, then it won't be too bad...." Such statements are naturally impermissible. Medical workers must generally display caution in their communication with patients, and mind their words.

Against what diseases can psychotherapy be applied successfully? It can be used to cure hiccuping, bedwetting in children, which is so mortifying to the child and his parents, and chronic alcoholism. It is believed that psychotherapy produces its greatest impact against neuroses (hysteria, neurasthenia, psychastenia, obsessive states). Various phobias yield well to treatment: fear of heart disease (cardiophobia), fear of cancer (cancerophobia), and so on.

In expert hands, psychotherapy may find broad application and bring considerable benefit to many people.

In addition to suggestion in a wakeful state, in a number of cases we can employ suggestion in hypnotic sleep. Hypnosis is defined as artificial submersion of the patient in a dreamy (sleepy) state, in which he weakly perceives stimuli around him and keenly attends to the words of the physician (hypnotizer). In such partial sleep of varying depths, the hypnotized individual is in a state of heightened suggestibility, owing to which a favorable situation is created for reception of the physician's suggestions concerning disappearance of certain symptoms of disease. Many patients experience a significant improvement in their condition and, in a number of cases, even recovery following hypnotic sleep. Hypnosis produces positive results in the presence of various disturbances of the autonomic-vascular system, neuroses, and functional disturbances in the activities of internal organs.

The psychotherapeutic technique of autogenic training has enjoyed widespread acceptance in recent years. In this technique the physician writes up special instructions which the patient subsequently follows. Owing to constant training, the latter acquires the capability for concentrating his attention and eliciting a number of sensations within himself; he achieves relaxed breathing, uniform pulse, and so on. The value of this technique lies in the fact that patients participate actively in their own treatment. As a result of such treatment the patient becomes to a certain extent the "master of his behavior," which is very important to persons suffering neuroses.

Thus psychotherapy is a very promising method which will doubtlessly assume a worthy place in the treatment of a number of diseases.
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PSYCHOPATHY AMONG SCHOOLCHILDREN

Moscow MEDITSINSKAYA SESTRA in Russian No 5, 1979 pp 30-33

[Article by Cand Med Sci M. I. Buyanov]

[Text] Often after fights people call each other psychopaths--that is, subjects with intolerable and conflicting characters.

What is psychopathy?

This word was applied to the most diverse nervous and mental disorders until the end of the last century. Then a desire arose to narrow its content down. In the late 19th century the Russian psychiatrists I. M. Balinskiy and V. Kh. Kandinskiy, the German physician I. Koch, and others began to define psychopathy as a pathological state of the entire human personality with all of its components, having in mind primarily character, temperament, and so on, manifested as pronounced and constant dysharmony in emotional and volitional aspects.

Psychopaths are people at the borderline between mental pathology and mental health. The special properties of their character manifest themselves following lengthy communication with other people, leading to impairment of the capacity for enduring adaptation to particular conditions of life.

All personality traits encountered in psychopaths are also found in completely healthy people, but while the few unusual traits of character of the latter are balanced off by other personality features, the pathological personality traits of psychopaths are so pronounced, they combine with each other in such a way, and they are so noticeable and poorly concealed that they produce a distinct personality with a harsh character that brings misfortune to both surrounding individuals and the psychopath himself.

Seven-year old Volodya was distinguished by extreme excitability and explosiveness from his early years. Whenever something did not go his way, he was quick to insult, he began fighting, and his desire to take revenge for an insult, usually imagined, was uncontrollable. The boy

remembered insults for 2-3 months, which is usually atypical of children. Rancor, vengefulness, cruelty, excitability, and pugnacity were all quite evident to those who came in contact with Volodya for even a short time. The child's parents and grandmother suffered especially from his imbalance: He reminded them of insults many months past, and he maintained a distorted sense of vengeance about them. In all other respects the boy was in no way out of the ordinary: His physical and intellectual development was the same as his peers, he was rarely sick, and so on. They said of him at nursery school: "A smart boy, but a terrible character." When Volodya entered primary school, for the first while he remained peaceful, but then almost perpetual conflicts with fellow classmates began. During these conflicts Volodya began to fight, he ceased to take responsibility for his acts, and he behaved himself--in the teacher's words--as if he were mentally ill. Once during a fight resulting from Volodya's attempts at bringing the class to order--his definition of order, the boy became so "infuriated" that he hit a fellow classmate in the eye, almost blinding him. After this his teacher demanded of his parents that they take their son to a child psychiatrist, who diagnosed excitable psychopathy in the child. Questioning close and distant relatives of Volodya to reveal specific features of his character, the psychiatrist discovered that the overwhelming majority of them had the same personality properties that were expressed by the boy in exaggerated and monolithic form. Individual traits scattered among the characters of numerous people of different generations were miraculously "combined" in the boy's personality, to the misfortune of all who came in contact with him. The heredity origin of Volodya's psychopathy could not be doubted.

These traits of character also manifested themselves since early childhood for 8-year-old Sasha, but beginning at 7 and 8 years old they began to show a tendency to weaken somewhat. Besides excitability, cruelty, the desire to impose his will on surrounding individuals, impatience, and many other psychopathic traits, Sasha exhibited greater tiring, frequent headaches, poor tolerance of heat, stuffiness, and car trips, and other signs of the psychasthenic syndrome. On attentively studying Sasha's mind, physicians concluded that the boy was suffering so-called organic psychopathy caused by brain injury that had occurred in the intrauterine period.

Thus although the external manifestations of character dysharmony were similar in the two boys, the problems had different origins and were treated in different ways. While Volodya's physician prescribed mainly preparations which reduced his nervous system's excitability, irritability, rancor, vengefulness, and so on, and while his character became more moderate with time, Sasha's physician recommended, in addition to preparations of similar but less pronounced action, an easier schedule and afternoon naps; he prescribed infusions of glucose and ascorbic acid and injections of magnesium sulfate and other preparations with general strengthening, resolving, and sedative action. The physicians warned the parents of these patients of the need for being stricter with their children and for avoiding indulgence of their wishes and whims; instead, they had

to patiently and persistently nurture self-control, the ability to monitor one's behavior and cover up character defects, and so on in the children. Inasmuch as all psychopathic personalities are egoistical, from early childhood they must be discouraged from vanity and from the desire to make only their demands first, they must not be permitted to become undisciplined, and so on.

Psychopathies such as those described above are also distinguished by the fact that they are accompanied by moral defects. These people are unable to draw lines between what is bad and what is good, and they are distinguished by cruelty and callousness.

Absence of a sense of guilt and repentance is typical of most psychopathic personalities. This is why these lacking properties must be nurtured in such children.

Psychopathic personalities exhibiting excitable traits are revealed rather quickly, and one way or another they soon come under the attention of child neuropathologists or psychiatrists, inasmuch as they quickly turn attention to themselves in view of their excitability and propensity for conflict. However, there is a group of psychopathies which do not reveal themselves right away, since children and adolescents suffering them do not seriously undermine discipline in the classroom, they do not attract attention by their provocative behavior, and they do not cause much trouble to surrounding individuals. Moreover, as a rule these children study well and maintain a good record in school. Nevertheless sooner or later it is discovered that their characters possess a little too many unusual traits that make such persons psychopathic subjects.

Twelve-year-old Kostya was clumsy and awkward from early childhood, he was unable to stand up for himself, and he spent the greater part of his time reading books. He learned to read when 4 years old, and from then on his parents never saw him spending his time with anything else but books. He was well read, far beyond his years. Kostya quickly earned glory as a "child prodigy." On entering school, the boy's teachers noted that he was noncommunicative, that he remained inaccessible to his peers, and that he was experiencing some sort of disproportionate, dysharmonic development: He knew many things that his peers did not, but at the same time he did not know things that were known to all of his classmates. Reticent and reluctant to communicate, the boy remained unnoticed in the class, and he did not take part in children's pranks and games.

In the first while his parents did not turn serious attention to the mental peculiarities of their son ("We were like that ourselves when we were children, but later on we changed," said his parents, mathematicians by profession). However, after their son reached 10 and 11 years of age they began to feel concerned: Kostya's pathological traits of character did not diminish; on the contrary they underwent amplification. Moreover he himself began to be somewhat uncomfortable about his character, which

kept him from communicating with his classmates. The boy now began to blame his parents for "awarding" him with such qualities, and he began to demand from his mother that she consult with specialists and try to alter his character. Thus he ended up in a psychiatrist's reception room. Kostya did not feel himself to be sick. He had no spiritual need for ridding himself of his noncommunicativeness, but he "intuitively understood that it is better to be communicative than introverted." His condition improved significantly through treatment. The boy's desire to rid himself of pathological character traits played a great role.

Kostya had so-called schizoid personality traits--one of the variants of psychopathy. Some other forms of psychopathy may also be encountered. Adolescents sometimes suffer the psychasthenic form of this disease, which manifests itself as a pronounced propensity for pathological doubts, as lack of self-confidence, and as an inability to make a particular choice in a given manner.

As all people change in the course of their lives (sometimes beyond recognition), so psychopathic subjects change. In general terms these changes are something like this. Psychopathic properties reveal themselves in early childhood, and in most children and adolescents they become noticeable at school age. Then they begin to gradually diminish in 60 percent of such persons. Education oriented at suppressing certain properties of character, a relaxed situation at home, absence of bad models for imitation and of some other social and psychological factors, and absence of additional head injuries, infectious brain injuries, and so on, play a major role in this. As the individual reaches adulthood, as he gains the wisdom of life, practicality, cautiousness, and foresightedness, which of course do not appear spontaneously but arise as a result of the appropriate education, and as he begins to think more and more about his own place in life, such a person begins to experience complete or partial "depsychopathization," or disappearance of abnormal character traits. In only about 35-40 percent of the cases do psychopathic properties continue to dominate the character and even undergo aggravation in adolescence, when even normal adolescents begin to become uncontrollable, coarse, and rough. It is precisely during adolescence that many subjects with psychopathic character traits begin to break laws, stop studying at school, behave provocatively, begin smoking and drinking, and so on. Following adolescence about half of them experience a dramatic decline in emotional and volitional dysharmony for the same reasons leading in a number of cases to harmonic character development in the prepuberty period.

Usually at 25 to 50 years psychopathic properties noticeably decline and the individual's state undergoes relative compensation, which can be disturbed by various unfavorable situational and traumatic factors. In the period of involution (after 50-55 years) many people experience a deterioration of character, since development of sclerosis in cerebral vessels may reduce the controlling capability of the intellect and diminish the ability for voluntary control.

Psychopathic character traits may undergo intensification or reduction (going as far as complete disappearance) under the influence of situational factors, which in turn play a major role in the arisal of this pathology, since parents not only "award" a corresponding combination of genes to their progeny but also surround them with a particular psychological climate.

This is precisely why most psychiatrists emphasize that although heredity does have decisive significance in the arisal of psychopathies, it is upon education and the family situation that first the degree to which pathological features ingrained in the child's constitution reveal themselves, and second, the extent to which they decrease if they had already revealed themselves earlier depend. Despite the fact that medicinal treatment is necessary in the presence of many psychopathies, it is precisely upon the family that the effectiveness of the treatment depends, since it must always be combined with the appropriate educational influence. Without help from parents and teachers, it is practically impossible to rid a child of psychopathic character traits, even given the most sophisticated medicinal therapy.

This character disorder must not be sought in all children and adolescents, all the more so because psychopathies, in the full sense of the term, are encountered extremely rarely: What we usually see is individual psychopathic properties of character, which should disappear with proper education.

So-called psychopathy-like disturbances arising in response to brain contusions and many other organic afflictions must be distinguished from psychopathies; psychopathies should also be delimited from pathological personality formation, where in response to chronic neuroses, gross mistakes in education, and experiencing of chronic disabling physical disease by the child or adolescent the latter gradually undergoes a change in character, becoming more and more difficult. Not being psychopathies, these disturbances pass after their causes are eliminated. However, only a specialist can make a correct diagnosis of a patient and determine precisely what the child or adolescent has--psychopathy, individual psychopathic character traits, pathological personality formation, or a psychopathy-like disturbance. This is why parents must not take any sort of decisive steps without first consulting a specialist.

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INFLUENZA PSYCHOSES

Kiev VRACHEBNOYE DELO in Russian No 5, 1979 pp 69-73

[Article by Cand Med Sci A. D. Revenok, Kiev City Clinical Psychoneurological Hospital No 21 imeni Academician I. P. Pavlov]

[Text] Considering the nature of influenza's occurrence today which, as Smorodintsev reports (1), is distinguished by extremely widespread epidemics and which affects 20-25 percent of the entire population and, in years of major outbreaks, up to 50 percent and more each year, the psychological pathology of this infection is acquiring increasingly greater importance.

The epidemiology of influenza psychoses has not been discussed sufficiently in either the old or the new psychiatric literature. Special research has not been conducted. There are only individual, isolated and contradictory reports pertaining to some questions concerning the morbidity of this form of mental pathology. On the whole the problem has never been fully studied.

I performed an extensive clinical-epidemiological study of influenza psychoses using census data on mental patients registered in the republic's therapeutic-preventive psychiatric institutions, and materials covering many years of my own clinical observations, first in Cherkasskaya Oblast and then continued at the Kiev City Clinical Psychoneurological Hospital imeni Academician I. P. Pavlov. I established in this case that within the group of infectious psychoses, influenza-based mental pathology is uppermost. Influenza psychosis morbidity varies in different places, in different years, and in different epidemics, from 1.5 to 4.2 per 1,000 reported cases of influenza. The morbidity index for every 100,000 population is 1.11 (1.01 for urban residents and 1.23 for rural residents). The occurrence of influenza psychoses is 6.3 (correspondingly 6.0 in the city and 6.6 in the countryside) per 100,000 residents.

My explanation for the significant dominance of influenza psychoses among mental illnesses of infectious origin is that influenza is presently not only the most widespread but also one of the most neurotropic infections.

Examining morbidity figures for influenza psychoses covering the last 20 years, I established that the absolute majority of patients usually enter psychiatric hospitals toward the end of an epidemic outbreak and some time following its conclusion.

This feature was observed in the pandemic of "Asian" flu, which according to Korniyushenko (2) appeared in Kiev in May-June 1957, developed intensively in September, attained its maximum between 7 and 16 October, and then declined. Hardly no influenza psychoses were recorded prior to September during this pandemic. They did not arise in large quantity until the second half of October and in November 1957, when the "Asian" flu pandemic was actually coming to its end--that is, 5 months after the first local outbreaks occurred. Of the total quantity of influenza psychosis cases recorded in this pandemic, 89.1 percent fell within the postepidemic period.

This characteristic of the occurrence of influenza psychoses was noted not only for the pandemic "Asian" flu but also for the commonplace, constantly recurring epidemic outbreaks. As an example the 1976 epidemic, which was elicited by influenza virus A₂ (Victoria) 3/75, attained its maximum in February, and the maximum number of influenza psychoses (70.7 percent) occurred in March and in subsequent postepidemic months.

This rule is typical of influenza epidemics of both type A and type B. It can be explained by possible intensification of the neurotropic properties of influenza virus towards the end of an epidemic as a result of numerous passages occurring in the course of the epidemic process; by arising of repeat influenza illnesses by this time and more-frequent occurrence of various complications of other viral and bacterial origin; by growth in the infectious and allergic sensitization of the body, and by manifestation of effects of some other unfavorable factors promoting development of influenza psychoses. A last explanation would be hospitalization of patients exhibiting delayed development and late initiation of pronounced psychosis. There is a certain seasonality in the occurrence of influenza psychoses.

I established that they arise two to four times more frequently (44.6 percent) in winter (December-February) than in any other time of the year.

The occurrence of these psychoses is rather high (28.1 percent) in spring as well, being 15.1 percent in summer and 12.3 percent in fall. Thus the lowest influenza psychosis morbidity is in fall.

Age and sex factors have a certain amount of significance to arising of influenza-related mental pathology. Psychoses developed predominantly among persons 20-50 years old. This age group is responsible for 61.4 percent of the total morbidity. Influenza psychoses do not occur frequently among children up to 14 years old (17.9 percent), and they are observed even more rarely after 50 years (9.8 percent).

Analysis of individual epidemics revealed noticeable differences in the age composition of influenza psychotics. In the 1968 epidemic, which was elicited

by influenza virus A₂ (Hong Kong), influenza psychoses occurred mainly among persons 30-34 years old; children were rarely stricken in this epidemic, and there were no psychotics at all among persons more than 55 years old.

In the 1972 and 1975 epidemics most of the patients were persons 20-24 years old. Influenza psychoses were observed in these epidemics at practically all ages except childhood.

Those falling ill in the 1974 epidemic caused by mixed virus infection (A₂ + B) and in the 1977 epidemic (influenza B), were noticeably dominated by persons 35-39 years old. The same can be said for the spread of influenza psychotics in relation to sex. Of the groups analyzed, 40.3 percent were men and 58.7 percent were women. These ratios are not constant, changing in different epidemics. As an example more men and fewer women fell ill in the 1970 and 1975 epidemics. The reverse was true in the epidemics of 1972, 1977, and especially 1974 (elicited by virus A₂--"Port Chalmers"--in combination with influenza B): Women noticeably dominated those stricken with influenza psychoses.

laborers and kolkhoz farmers taken together make up 33 percent of patients suffering influenza psychoses. The occurrence of influenza infection and, consequently, of psychoses depends on the intensity of communication within the production collective. Influenza psychosis morbidity also depends significantly on the state of specific immunity.

Mortality due to this pathology varies from 1.73 to 6.6 percent in different epidemics.

My research showed that out of the three influenza agents described in the literature to date--A, B, and C (3), types A and B are the most frequent cause of influenza psychoses. Influenza A has independent significance to development of influenza psychoses in relation to 40.0 percent of the patients, while the figure for influenza B is 23.3 percent.

A significant proportion of the patients (32.3 percent) develop influenza psychosis owing to associated infection by two viruses--A and B. In such cases type B influenza infection is superimposed over type A influenza infection, or type B follows type A following a short interval. The reverse may happen as well, with influenza B occurring first and influenza A appearing next, which is confirmed by joint growth in the titer of specific antibodies to both viruses in blood serum by 2-4-8 times. Such combinations of influenza A and B viruses are encountered much more frequently in my data than is the case with uncomplicated influenza (occurring without psychosis) (V. I. Il'yenko, 1973), which is apparently one of the important etiological factors promoting development of influenza psychoses. When a patient is infected by influenza A and B viruses together, antigens revealed in brain tissues are usually those of the virus exhibiting the blood antibody titer that is significantly lower or entirely absent.

I also established that type A or type B influenza infection was associated in some patients with parainfluenza viruses (1.7 percent). It was found in this case that influenza virus antigens could be detected only in brain tissues while parainfluenza antigens could be detected only in lung tissues. In some patients influenza B virus interacted with adenoviruses (0.6 percent). Conditionally pathogenic bacterial microflora were often activated under the influence of both type A and type B influenza infection.

Little research has been conducted on the role of influenza C in development of influenza psychoses. Morozkin, Khersonskaya, and Buslenko (4) observed one convalescing patient out of 282 stricken with influenza C who developed acute postinfectious psychosis requiring special hospitalization. I also noted from data collected at the Kiev City Clinical Psychoneurological Hospital named Academician I. P. Pavlov that antibodies to type C influenza virus were often discovered at dilutions of 1:20 and 1:160 in the blood serum of patients in former epidemics, indicating that they had suffered type C infection before. The etiological role of A, B, and C influenza viruses in the arising of influenza psychoses depends to a significant degree on the occurrence of each of them in the given epidemic--that is, on the epidemiological situation.

The pathogenesis of mental pathology resulting from influenza-caused nervous disorders is complex. I believe from my virological studies, anatomopathological data, and clinical observations that in addition to the toxic effect of viral antigens on the body, both direct affliction of brain matter by type A and type B influenza viruses and secondary disturbances associated with injury to brain vessels and cerebral membranes have certain significance in arising of influenza psychoses. Doubtless evidence of this can be found in the fact that these viruses or their antigens were revealed in the brain tissues of 78 of my patients (in the 3rd-34th and 57th days from the beginning of influenza illness; these times may apparently be longer).

As a rule influenza virus could be detected in these patients in chunks of brain tissue taken from the frontal lobes. In one case the virus was isolated simultaneously from the the frontal lobes and the olfactory lobes. Influenza antigens were also detected predominantly in material taken from the anterior lobes. In one of these cases it was revealed in the diencephalic region. Influenza virus A antigen was detected in three patients not only in frontal lobes but also in the olfactory lobes, while one of them also had antigens in the convolution of the cingulum and on the inner surface of the olfactory bone.

I attach important pathogenic significance to the latter cases in explaining the possible ways by which influenza virus can penetrate to the central nervous system out of initial places of infection (upper respiratory tract, nasal cavity).

Detection of influenza viruses or their specific antigens predominantly in the anterior portions of the brain, especially in the olfactory lobes,

entitles me to suggest that they spread in the patient's body not only through the blood system but also by other means. Apparently in some cases of influenza-caused mental pathology influenza viruses may bypass the hematoencephalic barrier and penetrate into the cranial cavity through the reticular septum along the endings of the olfactory nerves (perineurally); then, entering the olfactory lobes, which are associated with nuclei of the brain stem and the diencephalon, they spread farther, causing primary infection of the corresponding brain divisions.

This path of penetration of disease agents into the brain is also typical of poliomyelitis virus, for which it has been proven to exist (5). This path is apparently also available to influenza viruses.

Moreover we can assume that influenza virus penetrates into the central nervous system also through the dense network of the highly branched trigeminal nerve.

It has now been precisely established that viremia often arises in the first 3-4 days of influenza illness; this is why the hematogenic pathway for penetration of virus into the brain is also naturally possible for patients with influenza psychoses. The possibility is not excluded that the virus penetrates from places of initial infection into the central nervous system through lymph vessels, which form a superficial and a profound network communicating directly with the subarachnoid space. It is entirely probable that the perineural, hematogenic, and lymphogenic pathways of viral penetration into the brain do not exclude but more likely supplement one another.

In addition to initial injury of nerve cells, taking the form of encephalitis, patients with influenza psychoses exhibit affliction of cerebral vessels and membranes--arachnoencephalitis and meningoencephalitis. Influenza hemorrhagic encephalitis, which also afflicts vessels and assumes a focal nature, is the extreme variant of such affliction.

Pathohistological analyses revealed plethora of the brain and cerebral membranes, focal arachnoidal and diapedic hemorrhaging in brain tissues and membranes, and fibrinoid swelling of the walls of vessels, many of them having thickened, semitransparent, homogenated walls; the endothelium of many vessels is swollen, sometimes pyknomorphous, and so on.

In cases where influenza infection is associated with infection by parainfluenza viruses, adenoviruses, or bacterial microflora, the latter promote faster and more severe affliction of the central nervous system, which is what I noted among some patients under my observation. Mixed infection, especially viral-bacterial infection, which has important significance to the pathogenesis of influenza psychoses, not only has a great effect on their clinical manifestations but also complicates the pattern of pathomorphological changes arising in response.

The long-lasting, cyclic nature of the temperature reaction exhibited by patients with influenza-caused mental pathology may be explained by reproduction of the disease agent first in places of initial infection, followed by manifestation of the agent's vital activities and its reproduction in various divisions of the central nervous system.

The beginning and subsequent development of psychotic symptoms and the outcome of influenza psychosis depend on the intensity of the infectious process, the particular features of its spread in areas of secondary infection, and any additional infection by microflora. This makes it understandable why despite the fact that influenza is an acute disease influenza psychoses are acute in some cases and subacute in others, arising both at the peak of infection and following its attenuation (in an average of 5-7 days), and why such psychoses may either be short-lasting or exhibit a protracted or even chronic progressive nature.

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THE CHARACTERISTICS OF THE TOXIC ACTION OF BUTYL CHLORIDE AS A POLLUTANT OF SEWAGE OF CHEMICAL ENTERPRISES

Kiev VRACHEBNOYE DELO in Russian No 7, 1979 pp 105-107

[Article by L. A. Tomashevskaya, Z. I., Zholdakova, The Laboratory of Biological-Hygienic Research (Head--Doctor of Medical Sciences M. I. Rudnev) of the A. N. Marzeyev Kiev Scientific Research Institute of General and Communal Hygiene]

[Text] At the present time the critical conditions of water supply in individual industrial rayons are conditioned not only by the limitedness of water resources and the growing requirement for water but also in a significant degree because surface reservoirs are polluted with industrial sewage. The study of diversity of chemical compounds entering into their make-up, is of definite interest. A significant place among the latter is occupied by butyl chloride which is an intermediate product in many technological processes of chloroorganic synthesis.

The data of the literature about the toxicity of chloroorganic compounds witness to the fact that these substances possess to various degrees a narcotic and irritating action for the skin and mucous membranes. High concentrations of them may have a general toxic influence. There is not a direct correlational link between the toxicity and the physico-chemical properties of the mentioned compounds. The general toxic influence of chloroorganic compounds of the aliphatic series intensifies with an increase of the number of CH_2 groups in the molecule (A. S. Smirnova, 1961; N. V. Lazarev, 1963; A. V. Basalayev and coauthors, 1972; F. P. Trinus and coauthors, 1972).

Regardless of the wide distrubition and use in production, information in the literature about the toxic action of butyl chloride is very limited, and there are not regulations about its gaining access to water of open reservoirs.

Butyl chloride is a chlorine derivative of saturated hydrocarbons of the aliphatic series with a molecular weight of 92.57 and a specific weight

of 0.882. Its structural formula is $\text{CH}_3\text{CH}_2\text{-CH}_2\text{-CH}_2\text{-Cl}$. This is a slightly yellowish oily liquid with a specific odor. In the limits of solubility it does not color water and does not disturb its transparency.

Butyl chloride changes the organoleptic properties of water, giving it a strange odor. The threshold magnitude for this index is 0.4 mg/l; the practical limit is 0.8 mg/l. The odor possesses a moderate stability.

The influence of butyl chloride on the processes of natural self-purification of water was evaluated by the quantity of oxygen dissolved in the water, the oxygen consumed, the intensiveness of the biological requirement of oxygen over 20-25 days in the dynamics and processes of nitrification (ammonium, nitrite, and nitrate nitrogen).

The results of the tests allow us to conclude that butyl chloride in a concentration of 50 mg/l elicits a short-term inhibition of the biological requirement for oxygen in the first days of the test and on inhibition of the processes of nitrification. With a concentration of butyl chloride at a level of 10 mg/l the growth of nitrite nitrogen becomes slower for 3 to 4 days, which allows us to consider this concentration a threshold one in its influence on the sanitary conditions of reservoirs.

Upon carrying out tests with toxic and subtoxic doses of butyl chloride the following goals were pursued: to establish the lethal doses of the preparation for introduction into the intestinal tract, to clarify the clinical picture of poisoning and the species sensitivity of laboratory animals, and to study the cumulative properties of the substance.

The toxicity of butyl chloride upon one-time introduction was studied in 12 white mice, 48 white rats and 10 porpoises. The presence of local irritative properties led to the necessity of introducing butyl chloride as oily solutions.

The death of animals occurred as a rule in the first 2 days. For the clinical picture of poisoning the presence of an irritating action on the upper airways, a disturbance of breathing and a disturbance in the central nervous system was characteristic.

According to the results of an acute experiment by the method of Deichman and Le Blanc, the magnitude of LD_{50} for white mice was determined to be 5600 (4499+6701) mg/kg, for white rats, 2200 (1856+2545) mg/kg, and for porpoises, 8000 mg/kg. The comparative toxicity of butyl chloride for various species of laboratory animals witnesses to the fact that butyl chloride relates to low toxicity substances. The most sensitive were white rats, the least sensitive were porpoises.

The cumulation coefficient was determined in a subacute experiment with the introduction of butyl chloride in doses equal to 1/3 and 1/10 LD_{50} . In each group there were 20 animals. The experiment continued 3 months and in all 5.5 average lethal doses were introduced with the daily introduction of 1/10 LD_{50} and in all 6.5 average lethal doses were introduced with the daily introduction of 1/3 LD_{50} .

The cumulation coefficient calculated according to the method of Yu. S. Kagan is 6.6 for 1/5 LD₅₀ and 8.5 for 1/10 LD₅₀. Judging from the results of the experiment, butyl chloride is related to substances which accumulate little. With an increase of the dose the cumulative properties manifest themselves more strongly. As a result of the long drawn-out introduction of butyl chloride in a dose equal to 1/10 LD₅₀, the condition of adaptation develops: At the end of the subacute experiment butyl chloride was introduced into the remaining animals in a dose equal to LD₅₀ and not one animal died.

The cutaneous irritant action was studied in white rats. The introduction of butyl chloride on the skin leads to the development of an inflammatory reaction in the place of application. Signs of inflammation disappear in a week. At the place of application a large laminated desquamation which does not affect the subepidermal layer and a light yellow coloration of the skin are noted.

Upon establishing the subthreshold nonacting concentration of butyl chloride in a chronic sanitary-toxicologic experiment, the following doses were investigated: 1/1,000 LD₅₀ - 2 mgm/kgm, 1/1,000 LD₅₀ - 0.2 mgm/kgm, and 1/100,000 LD₅₀ - 0.02 mg/kgm. The experiment was carried out on 58 white rats, to whom daily in the course of 6 months butyl chloride in an oily solution was introduced into the intestinal tract. A group of animals receiving vegetable oil served as the control.

In the course of the chronic experiment monthly examination of the activity of enzymes in the animals was carried out: Cholinesterase in the blood (according to the method of Khestrin), succinate dehydrogenase in the blood serum (V. S. Asatiani, 1969), alkaline phosphatase (according to the method of Bodanskiy), the content of inorganic phosphate in the blood (A. E. Sharpenak, V. A. Konyshov, 1969).

The determination of the morphological composition of the blood, the bioelectrical activity of the brain and the frequency of cardiac contractions was carried out on the first, third and sixth months of the introduction of butyl chloride. At the mentioned times butyl chloride in doses of 2, 0.2, and 0.02 mgm/kgm did not essentially change the bioelectrical activity of the brain and the frequency of cardiac contractions, the content of hemoglobin, the general quantity of erythrocytes, leucocytes, and the differential count. Displacements observed proved insignificant and did not exceed the limits of the physiological norm.

The chronic introduction of butyl chloride in a dose of 2 mgm/kgm was accompanied by a disturbance of enzymatic activity of the blood. In the first month, decrease of the activity of alkaline phosphatase was observed and in the second an increase of activity was observed ($P < 0.01$). At the succeeding times significant deviations were not noted.

As is seen in drawing 1, the activity of cholinesterase in the course of the first three months of poisoning was not distinguished from control magnitudes. Beginning from the fourth month and till the end of the experiment, a decrease of activity of 27% on the average was observed ($P < 0.05$). A certain increase of the activity of succinate dehydrogenase ($P < 0.05$) was noted at the fifth month of poisoning.

Drawing 1. The influence of butyl chloride on the activity of cholinesterase in the blood of rats.



- Key:
- 1. micrograms/min
 - 2. control
 - 3. 2 micrograms/kgm
 - 4. 0.2 mgm/kgm
 - 5. background
 - 6. months

Data about the content of inorganic phosphate are presented on drawing 2. An increase ($P < 0.05$) of the level of inorganic phosphate is noted from the third through the sixth months of observation under the influence of butyl chloride in a dose of 2 mgm/kgm.

Drawing 2. The content of inorganic phosphate in the blood of rats under the influence of various doses of butyl chloride.



- Key:
- 1. micrograms phosphate
 - 2. control
 - 3. 2 mgm/kgm
 - 4. 0.2 mgm/kgm
 - 5. background
 - 6. months

An analysis of the data obtained about the long-term influence of butyl chloride in doses of 0.2 and 0.02 mgm/kgm indicated the absence of statistically significant changes of the studied indices. Consequently as a result of the chronic poisoning with butyl chloride from the doses investigated one may identify the dose of 2 mgm/kgm as the maximally acting one.

On the basis of experimental data about the harmful influence of butyl chloride on the organism and on the basis of the conditions of water usage one may conclude that its threshold concentration judged by an organoleptic sign of harmfulness is 0.4 mgm/l and judged by general public health norms, it is 10 mgm/l. The inactive dose judged by sanitary-toxicologic signs of harmfulness is at the level of 0.2 mgm/kgm, which when translated into a concentration in water is 4 mgm/l. A comparison of these magnitudes allows us to consider the organoleptic sign of harmfulness the limiting one when fixing the rate of the content of butyl chloride in water of reservoirs.

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THE STATE OF IMMUNITY OF THOSE IN CONTACT WITH MIXED FEED AND MICROADDITIVES

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[Text] The growth of the numbers occupied in the production and use of combined fodders bring about the necessity of studying the influence of the given factor on the condition of the workers.

A series of authors mention the unfavorable action inherent in biological agents--components of combined fodders and microadditives to them (premixtures). In particular, the systematic inhalation of seed dust in large concentrations leads to an affliction of the organs of respiration, to autoimmune disturbances (K.A. Galkina and coauthors, 1969; E. V. Doroshchuk, 1976). Individual fungi included in the composition of the seed dust are allergenic and produce toxins (a type of aflatoxin) eliciting hemodynamic disturbances, and dystrophic changes in parenchymal organs (Kh. L. Galikayev, 1968; E. V. Doroshchuk, L. A. Nesterova, 1972). The influence of antibiotics in production conditions changes the natural resistance of the organism, promotes the formation of the autoimmune process. Investigators note in workers in the production of combined fodders and premixtures the frequency of allergic manifestations (Viskochil and coauthors, 1972; V. V. Svyatoslavova, G. A. Antonova, 1975; S. Kh. Nikolov and coauthors, 1976 etc.).

The absence of information about the influence of combined fodders and premixtures on the natural resistance and immunological reactivity as features defining the state of health of the workers was a cause for carrying out the mentioned investigations. Fifty-two workers of both sexes were examined (28 occupied in production, 24 in the preparation of premixtures). Seventeen people were in the control group. The age of those examined was from 20 to 39.

We judged regarding the natural resistance according to the content of lysozyme in the saliva (with sowing on meat peptone agar according to the method of Z. V. Ermol'eva, 1968) and in the serum (O. V. Bukharin, N. V. Vasil'ev, 1976), according to the quantity of Beta-lysin in the serum (O. V. Bukharin, N. V. Vasil'ev, 1977) and its bacteriocidal activity (Pilimer and coauthors, 1956). The intensiveness of phagocytosis was defined by the method of A. I. Ivanova and B. A. Chukhlovina (1967) modified by us with the simultaneous study of the morphological composition of the blood. The defensive properties of the skin and mucous membranes were defined according to the number of enteric bacilli and of cocci reflecting the bacteriocidal activity of the skin (N. N. Klemparskaya, G. A. Shal'nova, 1966). We characterized the immunological reactivity according to the change in the number of plaque forming cells in the blood (N. N. Klemparskaya, 1972, in modification V. S. Kislyakova, 1973), according to the results of the reaction of specific agglutination of leucocytes (P. N. Mats, 1961); the allergens were prepared according to instructions of N. V. Andrianova and S. M. Titova (1970). All the immunological indices were studied at one time.

In questioning the 56 workers and people of the control group we used a questionnaire proposed by the department of labor hygiene of the Central Scientific Research Laboratory of The Rzhyskiy medical institute.

Examination showed that in workers of the mixed feed shop of all comparable trades (fillers, loaders, magnet operators, metal workers, crushers, operators, laboratory workers) the bacteriocidal activity of the serum was decreased to 81.3 ± 6.7 with 21 ± 1.2 microbial colonies in the control ($P < 0.05$). The content of lysozyme in the saliva also decreased: a titer of $1:1367 \pm 105$ instead of $1:3450 \pm 390$ ($P < 0.05$). The level of lysozyme in the serum reliably dropped behind the analogous magnitude in the control group ($36 \pm 4.4\%$) only in loaders, magnet operators, fillers and crushers ($22 \pm 2.7\%$). In the workers in the shop of premixtures (measurers of salts and vitamins, female stampers, markers, operators, loaders and laboratory workers) the bacteriocidal activity of the serum was 265 ± 16 microbial colonies, the titer of lysozyme in the saliva was $1:1535 \pm 295$, the content of lysozyme in the serum was $15.7 \pm 0.7\%$ ($P < 0.05$). In the control group the bacteriocidal activity of the serum was equal to 21 ± 1.2 microbial colonies, the titer of lysozyme in the saliva was $1:3450 \pm 390$, and the quantity of lysozyme in the serum was $36 \pm 4.4\%$. The level of beta-lysin in the serum of the workers of both shops approached that in the control group.

On 1 cm^2 of skin of the workers of all professions in the mixed feed shop and the premixture shop the number of cocci reached 29 ± 2.7 with 17.1 ± 2.3 microbial colonies in the control ($P < 0.05$). The enteric bacillus did not appear on the skin and mucous membranes, and the decrease of the bacteriocidal activity of the skin in relation to the enteric bacillus was not significant. At the same time in three workers who had stopped work in the premixture shop 2 to 6 months before, on 1 cm^2 of skin 8 ± 1.4 colonies of enteric bacilli were detected (in the control 0 colonies were detected) with a decrease of bacteriocidal activity of the skin from 88 ± 1.9 to 68 ± 0.57 ($P < 0.05$). Obviously the absence of the enteric bacillus on the skin of workers is linked not with the skin's preservation of defensive properties

(the more so, since the quantity of cocci on the skin increased) but rather it is the result of the antagonistic action of the fungal flora.

In all the workers examined there was detected a decrease of the phagocytic activity of neutrophils. The percent of active neutrophils fluctuated from 25 ± 1.3 to 36 ± 0.7 (in the control it fluctuated around 52.8 ± 3.9 , $P < 0.05$). The index of phagocytosis was significantly different from that in the control group only in loaders, female stampers and markers (0.5 ± 0.17 instead of 1.4 ± 0.3) in the shop of premixtures. The influence of combined fodders decreased the digestive activity of neutrophils to 0.17 ± 0.1 (in the control it was 1.17 ± 0.2 , $P < 0.05$), and contact with premixtures decreased the digestive activity of neutrophils to 0.09 ± 0.01 ($P < 0.05$). In the first case a marked slowing of digestion was observed in 30%, and in the second case it was observed in 20.5%.

The decrease of the intensiveness of phagocytosis in workers of both shops is actually still greater, since a count of formed elements of the blood revealed a decrease in the content of polymorphonuclear leucocytes ($32 \pm 4.6\%$ instead of $58 \pm 4.3\%$, $P < 0.05$). The number of other cells, including eosinophils, corresponds to analogous indices in the control.

Complaints of the workers about a poor general state of health were the condition for the expediency of a questionnaire. In it it appeared that a third of the workers of the combined fodder shop noted weakness towards the end of their shifts, pains in the joints and in the region of the heart, irritability, colds, rarely a cough, edema, a propensity to sweat, itching. Those returning to work after holidays did not observe a poor general state of health. Half the examined workers of the premixture shop noted a tendency to sweat, shortness of breath, itching, frequent colds, a rash, localized depigmentation of the skin of the body and arms, very frequent nosebleeds (particularly at the stage of service of less than 2 years). The first week after holidays an increased fatigability was noted. Complaints of headaches, pain in the joints and in the region of the heart and shortness of breath were observed extremely rarely in the control group.

The material obtained gave basis for presupposing an allergic state of the organism, in conjunction with which were examined several indices of immunological reactivity. We judged about sensitization according to the data of the specific agglutination of leucocytes reaction. Upon examination of samples of blood from workers of the combined fodder shop, as allergens we used combined fodder for adult pig livestock (this manufacture is undertaken the most regularly) and crushed corn (comprises 40-60% of all combined fodder). For samples of blood of the workers of the premixture shop, the allergens chosen were antibiotics--streptomycin, tetracycline and furazolidone. Study showed that with the addition of the corn allergen, the agglutination of leucocytes was $17.4 \pm 2.3\%$ in 41.2% of the workers of the combined fodder shop, and with the addition of the allergen from the combined fodder the agglutination was $21.3 \pm 1.4\%$ ($P < 0.05$) in 13.3% of those examined. The most greatly expressed sensitizing

action was distinctive of furazolidone: after contact with it agglutination was equal to $13.9 \pm 1.9\%$ ($P < 0.05$) in 47.3% of the workers of the premixture shop. Sensitization to streptomycin and tetracycline was not displayed. Spontaneous agglutination in the test and in the control did not exceed $6.3 \pm 1\%$.

In workers of the combined fodder shop with a length of service of less than a year, in 1 mm^3 of blood, 9180 ± 320 plaque forming cells were detected (in the control 3330 ± 190 , $P < 0.05$). With a length of service from 1 year to 5 years, this index decreased to 5617 ± 154 ($P < 0.05$), and 1 to 2 years after stopping work its magnitude was approximately that of the control. In workers of the premixture shop, already after 2 months of work the number of plaque forming cells increased to 9213 ± 560 ($P < 0.05$). During the succeeding 3 years of work the index studied was equal to 7030 ± 96 ($P < 0.05$) and the magnitude with a length of service from 3 to 5 years was restored to the level of the control (3920 ± 60 , $P < 0.05$). One to 2 years after stopping work in the premixture shop once again 5520 ± 760 ($P < 0.05$) plaque forming cells were revealed in the blood.

The observations carried out witness that in workers occupied with the production of combined fodders and premixtures, a similar decrease of the absorptive and digestive ability of neutrophils, a decrease of the defensive properties of the skin, and a disturbance of the morphological composition of the blood were noted. The influence of premixtures to a greater degree than combined fodders disturbs the humoral indices of natural resistance. The decrease of natural resistance is most highly expressed in the combined fodder shop in stevedores and crushers, and in the premixture shop it is most highly expressed with prepackers, markers and stevedores. In the workers a frequent sensitization to corn and to furazolidone was displayed. The expressed allergenic action of corn in our opinion is caused not by its protein composition, but rather by the frequency (more than 80% according to the data of the microbiologist of the factory) of its contamination with an obvious allergen--fungi of the species *Asp. flavus*. The development of a premorbid condition, which the accumulation of plaque forming cells in the blood bears witness to (N. N. Klemparskaya, 1975) occurs significantly more rapidly upon contact with premixtures than with combined fodders. Adaptational reactions under the influence of premixtures develop later and are distinguished by less stability. Sensitive indices of the unfavorable influence of combined fodders and microadditions on the organism are the bacteriocidal activity of the serum, the content of lysozyme in the saliva and the serum, the digesting activity of neutrophils, the number of cocci on the skin, and the presence of plaque forming cells in the blood.

The decreased resistance of the organism and the disturbance of immunological reactivity in examined persons, especially expressed in workers occupied with the production of premixtures, indicates the necessity of rendering more healthy the conditions of labor at combined fodder factories.

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